

June 29, 2012

Ms. Kirsten Walli Board Secretasry Ontario Energy Board 2300 Yonge Street, 27th Floor Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: Union Gas Limited – 2011 Demand Side Management Audit and Results

In accordance with the EB-2006-0021 Decision with Reasons, please find attached Union's 2011 Demand Side Management ("DSM") Annual Report, the 2011 Audit Report, and the Evaluation & Audit Committee Summary Results and Responses to the Audit of Union's 2011 DSM Annual Report.

On April 2, 2012, Union circulated its Draft DSM 2011 Annual Report to the DSM Consultative and the Auditor, ECONorthwest.

On May 16, 2012 ECONorthwest provided the draft Audit Report to Union and Union's Evaluation and Audit Committee ("EAC"). Union worked in consultation with the Auditor and EAC to resolve any concerns in the Auditor's report and reached consensus on the results of the Audit within the June 29th filing deadline.

Yours truly,

[Original signed by]

Marian Redford Manager, Regulatory Applications

c.c.: C. Smith (Torys)

Final Audited Demand Side Management 2011 Annual Report

June 29, 2012



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Glossary of Terms

Adjustment Factor	An adjustment factor is the percentage of participants who install a measure and keep it installed. Adjustment factors are established through the interviewing of a random sample (statistically significant) of program participants conducted by a third party in order to validate measure installation. The adjustment factor is applied to an initiative's gross savings results
Avoided Costs	Avoided costs are a measurement of the reduction in the delivered costs of supplying resources (natural gas, electricity and water) to customers as a consequence of a program which reduces resource use by customers.
Base Case	A base case reflects a projection of the future without the effects of the utility's DSM program. "Base cases" are required for each and every DSM scenario, even those which are just a single technology or a single participant. The difference between the base case and the energy efficient case represents the saving attributable to the energy efficient measure.
Building Envelope	The building envelope refers to the exterior surfaces (such as walls, windows, roof and floor) of a building that separate the conditioned space from the outdoors.
Channel Partner	A Channel Partner is a company that in the course of its business can influence consumers to choose gas over competing fuels. Examples include appliance retailers, HVAC contractors, engineers, and architects.
Cost Effectiveness	Cost effectiveness refers to an analysis performed to determine whether the benefits of a project are greater than the costs. It is based on the net present value of savings over the equipment life of the measures.
Demand Side Manager	nent Variance Account (DSMVA) The existence and use of a DSM variance account provides a degree of flexibility for utilities as they undertake DSM investment. A DSM variance account may be used to rebate ratepayers at year end for unused budget allocation or to recover from ratepayers additional costs incurred for DSM programs.
Free Ridership	Free riders are program participants who would have installed the energy efficient measure without the influence of Union's DSM program. Free rider rates are estimated based on research, market penetration studies or through negotiations in prior evaluation processes. The free rider rates are applied to the gross program savings results to derive actual savings.
Incentive	An incentive is a transfer payment from the utility to participants aimed at encouraging participation in a DSM program.

- *Incremental Cost* The incremental cost is the difference in price between the efficient technology or measure and the base case technology. In some early retirements and retrofits, the full cost of the efficient technology is the incremental cost.
- Lost Revenue Adjustment Mechanism (LRAM) The LRAM is the Ontario Energy Board approved method by which utilities recover the lost distribution revenues associated with DSM activity. These lost revenues are calculated for each rate class impacted by DSM energy efficiency programs.
- **Net Present Value (NPV)** Net present value calculations rely on an discount rate to state, with a single number, what the value of a number of years of benefits are. The NPV then is the sum of the discounted yearly benefits arising from an investment over the life-time of that investment.
- **Net-to-Gross Ratio** Gross impacts are the program impacts prior to accounting for program attribution effects. Net impacts are the program impacts once program attribution effects have been accounted for. The net-to-gross ratio is defined as 1 (free ridership ratio) + (spill-over ratio).
- **Ontario Energy Board (OEB)** A regulatory agency of the Ontario Government that is an independent, quasijudicial tribunal created by the *Ontario Energy Board Act*. The OEB has regulatory oversight of both natural gas and electricity matters in the province.
- ParticipantsThe units used by a utility to measure participation in its DSM programs; such units of
measurement include customers, projects and measures or technologies installed.
Not all participants result in energy savings.
 - a) **Participants (when natural gas savings are claimed)** include gas saving measures or equipment (i.e. Boilers), packages of measure (i.e. ESKs), custom applications and services such as water heater tank de-liming. These participants are tracked through the Demand Side Management Tracking System (DSMT).
 - b) Participants (when no natural gas savings are claimed) include Feasibility and DAP study participants, energy audit participants, those who receive educational material such as the Wise Energy Guide as well as those who attend training sessions. These participants are tracked through the DSMT.
- **Program**A program is the utility's specifically designed approach to providing one or more
demand-side options to customers.
- Program EvaluationProgram evaluation refers to activities related to the collection, analysis, and
reporting of data for purposes of measuring program impacts from past, existing or
potential program impacts.
- **Research Costs** Research costs are the utility's costs associated with the research and evaluation of DSM programs. They are not included in direct costs because they may affect more than one program.

Spill-over	Spillover represents energy savings that are due to the program but not counted in program records. Spillover can be broken out in three ways:
	a) Participant inside spill-over represents energy savings from other measures taken by participants at participating sites not included in the program but directly attributable to the influence of the program
	 b) Participant outside spill-over represents energy savings from measures taken by participants at non-participating sites not included in the program but directly attributable to the influence of the program.
	c) Non-participant spill-over represents energy savings from measures that were taken by non-participating customers but are directly attributable to the influence of the program. Non-participant spill-over is sometimes called the "Free-Driver effect."
Shared Savings Mechar	nism (SSM) A Shared Savings Mechanism (SSM) is a financial tool that allows utilities and customers to "share" in the societal benefits that successful DSM programs generate. SSM can include incentives for both Resource Acquisition and Market Transformation DSM programs.
Total Resource Cost Tes	t The Societal Cost Test provides a measure of the benefits and costs that accrue to society as a result of the installation of a DSM measure. The Societal Cost Test has a provision whereby externality benefits, when quantified, can be included in the result. The SCT at \$0/tonne CO2 is also known as the Total Resource Cost Test (TRC).
Trade Allies	Trade allies include organizations (e.g. architect and engineering firms, building contractors, appliance manufacturers and dealers, and banks) that affect the energy-related decisions of customers who might participate in DSM programs.

Executive Summary

2011 represents Union Gas' fourteenth year of delivering cost effective Demand Side Management (DSM) programs to its broad customer base. To date, Union Gas' commitment to DSM initiatives has translated to approximately 976 million m³ of annual natural gas savings, equivalent to more than \$2.060 billion in net Total Resource Cost (TRC) benefits.

Union is pleased to report that the 2011 DSM portfolio generated 163.703 million m³ of natural gas savings from a program budget spend of \$25.914 million, which equates to a Shared Savings Mechanism (SSM) incentive of \$9.243 million. In 2011, Union had two initiatives measured by OEB approved performance scorecards: the Market Transformation and Low Income Weatherization programs. Having surpassed 100% of the performance metrics, the scorecard incentives total \$500,000 for Market Transformation and \$543,600 for Low Income Weatherization.

Union continued to deliver successful DSM activities in 2011 and pursue cost effective opportunities. Having surpassed the 100% TRC target within the program year, Union was able to access up to 15% additional funds over the DSM budget. The overall actual spend in 2011 was \$27,970,646; including \$1.025 million above the DSM budget of \$24.890 million, and \$2.056 spend of the \$2.465 million incremental Low-Income Plan budget. The actual DSM spend will be included in the DSM Variance Account (DSMVA) to "true-up" the variance between the DSM budget included in rates for the year and the actual expenditures.

Union's results in 2011 set a new high in annual natural gas savings achieved through program delivery. As the final year within the constructs of EB-2006-0021, Union celebrates the gas, electricity, and water savings that have been generated for ratepayers over the course of this framework.

1. Introduction

Primarily authored to present an annual retrospective of Union's energy efficiency initiatives and DSM portfolio results in terms of TRC, budget spend, Shared Savings Mechanism (SSM), and Lost Revenue Adjustment Mechanism (LRAM), the 2011 DSM Annual Report also serves as a vehicle through which to benchmark the results, highlight Union's successes and lessons learned, and summarize evaluation work conducted in 2011.

Since the introduction of Union's current DSM framework, the DSM budget has increased from \$17 million in 2007 by 10% in each subsequent year,¹ reaching \$24.890 million in 2011. Of the 2011 budget, \$1.464 million was included for Market Transformation programs and \$1.903 million for programs delivered to Low-Income Helping Homes Conserve (HHC) customers. Following the formula for calculating the TRC target,² Union's 2011 Net TRC Target of \$252,652,675 was filed with the OEB in Union's 2010 Annual DSM Report. Union surpassed that TRC target by \$127 million, achieving \$379,379,419 for the year's DSM portfolio at a total cost of \$25,914,863.

In addition, to the filed 2011 DSM Plan with the OEB of April 30, 2010, on September 9, 2010 the OEB outlined expectations that Union would file an incremental Low-Income Plan with additional funding if required. Union filed and received approval for the incremental plan (EB-2010-0055) which established a budget of \$2.465 million. Union developed in consultation with a sub-committee of stakeholder groups an incremental scorecard for its Home Weatherization program for low-income customers which included measurement of two equally weighted metrics: weatherization participants and total natural gas savings. Union achieved 136% of its scorecard, achieving an incentive payout of \$543,600, at a total cost of \$2,055,783.

Union's 2011 DSM portfolio included programs directed towards Residential, Low-Income, Commercial, and Distribution Contract (DC) markets as listed below:

Residential Markets (R):

- ESK Program
- Programmable Thermostat Rebate

Low-Income (LI):

- Helping Homes Conserve
- Home Weatherization program (Incremental Low-Income Plan)

Commercial (C):

- Cooking Equipment
- Laundry Equipment with Ozone
- Energy Star Dishwashers
- Condensing Make-up Air Units
- Hot Water Conservation Program
- Energy Recovery Ventilators
- Condensing Boilers
- Infrared Heaters

¹ As outlined in the OEB's Decision with Reasons dated August 25, 2006.

² As established in Phase 1 of the OEB DSM Generic Proceeding.

- Heat Recovery Ventilators
- De-stratification Fans
- Programmable Thermostats
- Efficient Pre-Rinse Spray Nozzles
- Demand Control Kitchen Ventilation
- Condensing Gas Water Heater s
- Front-Loading Clothes Washers CEE Tier2
- Steam Trap Survey
- Design Assistance Program
- Feasibility Studies
- Custom Projects

Distribution Contract (DC):

Custom Projects

Major TRC drivers for the 2011 DSM efforts are outlined in figure 1.0 below:



Figure 1.0, Major TRC Drivers

Program TRC results are presented in the body of this report and are benchmarked at the customer segment level against previous year's results in efficient technology units. Previously, Union's DSM Annual Report presented the year over year results in terms of TRC achieved, however input assumptions and adjustment factors for TRC vary from year to year, and as such, Union transitioned to tracking program success on a unit basis in 2009 in order to provide a clearer picture of milestones and achievements.

2. Planning and Evaluation Background

Operating within the evaluation parameters of the OEB approved 2007-2009 DSM Plan, Union continues to demonstrate its leadership role in the cultural shift towards energy efficiency and conservation. Union's DSM activities are driving market change through focused efforts on delivering natural gas savings and related customer benefits. Union's DSM portfolio includes a mix of Resource Acquisition and Market Transformation efforts.

With the exception of the Low-Income Incremental Plan Weatherization Program, all resource acquisition measures are screened for cost effectiveness using the TRC test as outlined in the Decision with Reasons EB-2006-0021 detailed in section 2.1 below. Union continued with the end-use customer funding approach in the Commercial Market, as well as advancing the multi-channel delivery methods to gain traction in the market. Programs that were less cost effective were scaled back or eliminated such as the commercial programmable thermostat offering.

Two sets of input assumptions form the basis for the 2011 DSM program evaluation as follows:

- The planning input assumptions used in this report for natural gas m³ savings, TRC results, and the SSM incentive are those filed by Union (EB-2010-0055) on May 18, 2010 and approved by the OEB on December 20, 2010. The 2011 Revised DSM Measures Update (EB-2011-0225) was filed on June 15, 2011 and approved by the OEB on July 13, 2011. The 2011 DSM New Measure Update (EB-2012-0053) was filed on February 8, 2012 and approved by the OEB on March 26, 2012. In addition, Union adopted measures that were filed by Enbridge (EB-2011-0254) and approved August 11, 2011.
- 2) For the LRAM section of the annual report, the m³ savings have been calculated using the most current input assumptions available at the time the Annual Report was completed.

Input assumptions for SSM and LRAM are provided in Appendix A.

2.1 Cost Effectiveness Screening

As mentioned above, potential DSM measures face a TRC screening test, which measures the benefits and costs of DSM investments from a resource perspective. Benefits include avoided natural gas, electricity, and water resource use and their associated costs, while the costs relate to the incremental cost of energy efficient equipment in relation to its non-efficient equivalent and any associated program support costs. Costs and benefits are projected over the Effective Useful Life (EUL) of the measure and discounted to calculate the Net Present Value (NPV).³ All TRC results reported are net of free rider calculations.⁴

Measures delivered through Union's DSM portfolio (with the exception of the Low-Income Weatherization and Market Transformation) must yield a benefit-cost ratio of 1.0 or more. Measures are evaluated annually to ensure they pass the cost effectiveness screening.

³ A discount rate of 10% is used to calculate the net present value.

⁴ Free riders are program participants who would have installed the energy efficient measure without the influence of Union's DSM program.

The Low-Income Weatherization program has an approved TRC threshold of 0.7. This lower threshold is intended to recognize that, while TRC captures all of the costs associated with deep measures, it does not capture non-energy benefits, which are difficult to quantify. Union follows the OEB approved file (EB-2010-0055) – Amendment to the 2011 Demand Side Management Plan – Incremental Low- Income Demand Side Management Plan.

In calculating the DSM associated avoided costs used in the TRC test, Union follows the methodology laid out by the OEB in the Phase 1 Decision of the DSM Generic Proceeding EB-2006-0021, as well as that approved by the OEB for Enbridge Gas Distribution in the EB-2005-0001/EB-2005-0437 proceeding. Calculating avoided costs for Union are related to customer rates as well as gas supply management policies and practices. The 2011 Union Gas Avoided Costs were included in the filing of the 2010 Union Gas DSM Annual Report.

2.2 **Program Evaluation & Verification**

There are two broad categories of evaluation activities: impact evaluation and formative evaluation. Impact evaluations focus on participation and related savings resulting from DSM programs. Among other things, formative evaluations focus on the effectiveness of program design and delivery to assess why effects occurred.

As part of Union's commitment to DSM, impact evaluation studies are performed annually to examine the accuracy of claimed savings. A summary of the impact evaluation studies undertaken in 2011 is provided in the Verification and Evaluation section (Section 9) of this report.

2.3 2011 Evaluation Priorities

Evaluation priorities are typically established through consultation with Union's Evaluation and Audit Committee (EAC), originally with the intention of evaluating input assumptions for each of the program measures included in the 2007-2009 DSM Plan over the course of the three years. While undertaking a third of measure evaluations annually was the initial strategy, many evaluation projects that might have been undertaken in 2009 were precluded by the OEB commissioning and approval of Navigant Consulting Inc.'s, *Measures and Assumptions for Demand Side Management (DSM) Planning*, dated April 16, 2009. In 2011, as Union entered the fifth year of a three year framework, this challenge remained unchanged. In addition, due to other competing priorities with the EAC, specifically new measure approvals and filing of the 2012-2014 DSM Plan, evaluation priorities were not identified for 2011.

2.5 2011 DSM Annual Report Audit

To substantiate Union's DSM Portfolio results, this DSM Annual Report is subject to an independent external audit, performed by ECONorthwest for the 2011 program year. The intention of the audit was to confirm to stakeholders that claimed DSM savings are correct and that the SSM, LRAM, Market Transformation, and Low Income incentive calculations are appropriate.

The Auditor was required to express an opinion on the appropriateness of claimed TRC, SSM, LRAM, Demand Side Management Variance Account (DSMVA), Market Transformation and Low Income based on their review of Union's Annual Report. The Auditor provided a final opinion on whether the

TRC Savings and amounts recoverable for SSM, LRAM, DSMVA, Market Transformation and Low Income have been correctly calculated using reasonable assumptions.

3. Overall 2011 DSM Program Results

In 2011, Union's DSM program generated net TRC benefits of \$379,379,419 for customers and 163,702,231 m³ in natural gas savings.⁵ Program spending in 2011 totalled \$27,970,646, including \$1.571 million for Market Transformation and \$2.056 million for Low-Income Weatherization. The Distribution Contract (DC) market continued to deliver the largest portion of savings in 2011 followed by the Commercial, Residential and Low-Income markets respectively.



Figure 3.0, 2011 Results by Sector (Percentage)

Union's TRC target for 2011, as filed in the 2010 Annual Report, was established as \$252,652,675. In an effort to achieve this target, Union focused on a balance of programs in each sector. Table 3.0 summarizes Union's overall DSM results for 2011 in comparison to 2009 and 2010.

Sector	Net TRC	Natural Gas Savings (m3)	Units	Expenditures	TRC per Dollar Spent
Residential	\$ 15,105,081	3,346,580	331,921	\$ 2,699,321	\$ 5.60
Low Income - HHC	\$ 15,068,454	3,179,042	123,038	\$ 1,729,178	\$ 8.71
Commercial	\$ 32,586,182	14,909,914	75,402	\$ 4,143,118	\$ 7.87
Distribution Contract	\$ 323,654,850	141,753,196	496	\$ 8,736,579	\$ 37.05
Low Income - Weatherization		514,499	450	\$ 2,055,783	
Market Transformation				\$ 1,571,520	
Other Direct Program Costs				\$ 7,035,147	
2011 Results	\$ 379,379,419	163,703,231	531,307	\$ 27,970,646	\$ 13.56
2010 Results	\$ 284,132,964	121,115,763	446,425	\$21,532,363	\$ 13.20
2009 Results	\$ 308,255,602	92,604,301	601,359	\$ 22,222,457	\$ 13.87

*Expenditures include program and incentive costs

⁵ m³ gas savings include Low Income weatherization program

DSM initiatives for 2011 were delivered through the sector-specific programs outlined in Table 3.1. These programs are designed to achieve savings in the areas of space heating, water heating, and the building envelope, as well as process-related energy applications.

Sector	Program				
	New Home Construction				
Pacidontial	Home Retrofit				
Residential	Market Transformation				
	Drain Water Heat Recovery				
LowIncomo	Helping Homes Conserve				
LOW INCOME	Weatherization				
Commorcial	New Building Construction				
Commercial	Building Retrofit				
Distribution Contract	Custom Projects				

Table 3.1 - Sector Programs

Union targets each customer sector with specific DSM programs, results for which are shown in Table 3.2 for TRC generating DSM programs.

Sector	Program	Units	Natural Gas Savings (m3)	Pro	ogram Costs	Program TRC
	New Home Construction	383	5,417	\$	1,934	\$ 31,132
Decidential	Home Retrofit	331,538	3,341,163	\$	955 <i>,</i> 596	\$ 15,073,949
Residential	Total Residential	331,921	3,346,580		957,530	15,105,081
Low Incomo	Low Income	123,038	3,179,042	\$	271,410	\$ 15,068,454
Low Income	Total Low Income	123,038	3,179,042	\$	271,410	\$ 15,068,454
	New Building Construction	989	4,459,258	\$	106,328	\$ 7,866,472
Commercial	Building Retrofit	74,413	10,450,656	\$	413 <i>,</i> 473	\$ 24,719,710
	Total Commercial	75,402	14,909,914	\$	519,801	\$ 32,586,182
Distribution Contract	Distribution Contract	496	141,753,196	\$	721,779	\$ 323,654,850
	Total Distribution Contract	496	141,753,196	\$	721,779	\$ 323,654,850
Total Pi	rogram Results	530 <i>,</i> 857	163,188,732	\$	2,470,520	\$ 386,414,566
	Salaries			\$	5,716 <i>,</i> 463	
	Administration			\$	48,946	
Othern Direct	Research			\$	800,179	
Other Direct	Evaluation					
Program Costs	Non-discretionary ¹			\$	388,809	
	Discretionary			\$	80,750	
	Total Other Program Costs			\$	7,035,147	-

Table 3.2 - Detailed 2011 Program Results by Sector

TOTAL 2011 TRC RESULTS

\$ 379,379,419

¹ Non-discretionary spend refers to evaluation work such as verification, sampling, annual DSM Audit, EAC and Consultative Meeting costs that are undertaken to support DSM savings claims and activities.

Sector	Program	Units	Natural Gas Savings (m3)	Program Costs		Program TRC
LowIncomo	Weatherization	450	514,499	\$	2,055,783	N/A
LOW INCOME	Total Weatherization	450	514,499	\$	2,055,783	N/A

Table 3.3 - Detailed 2011 Program Results for Low-Income Weatherization

As illustrated in Figure 3.1, Union's 2011 total natural gas savings across all programs was approximately 163.703 million m³.



Figure 3.1, Historical Savings Results

The 2011 OEB approved budget of \$27.355 million was 21% higher than the \$22.627 million budget approved in 2010. The approved budget includes \$2.465 million for the incremental Low-Income Plan. In 2011 Union spent over \$27.971 million on DSM, including over \$2.056 million on Low-income weatherization program and \$1.571 million on Market Transformation. A breakdown of 2011 expenditures by sector, compared to expenditures for 2009 and 2010, is shown in Table 3.4 and Table 3.5.

DSM Program Sector Costs	Incentives	Pre	ogram Costs	2	011 Total	2	010 Total	2	009 Total
Residential	\$ 1,741,791	\$	957,530	\$	2,699,321	\$	2,888,286	\$	2,838,449
Low Income	\$ 1,457,768	\$	271,410	\$	1,729,178	\$	1,575,064	\$	2,169,521
Commercial	\$ 3,623,317	\$	519,801	\$	4,143,118	\$	3,932,266	\$	4,637,816
Distribution Contract	\$ 8,014,800	\$	721,779	\$	8,736,579	\$	5,055,246	\$	5,022,108
Market Transformation	\$ 1,385,764	\$	185,756	\$	1,571,520	\$	1,328,450	\$	1,175,296
Total Program Sector Costs	\$ 16,223,440	\$	2,656,276	\$	18,879,716	\$	14,779,312	\$	15,843,190
Other Direct Program Costs				\$	7,035,147	\$	6,753,051	\$	6,379,267
Total Spending				\$	25,914,863	\$	21,532,363	\$	22,222,457

Table 3.4 - Overall 2012	1 Direct DSM Program Costs
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In keeping with the budget breakdown presented in the incremental Low-Income Plan, Table 3.5 presents the Low-Income weatherization expenditures.

Low-Income Initiatives	2011 Incremental Spend							
Weatherization Program								
Measures/Audits and Program Administration	\$	1,662,139.99						
Marketing and Education	\$	41,872.69						
Data Analysis	\$	290,300.00						
Basic Audit		N/A						
Other	\$	22.02						
Weatherization Program Subtotal	\$	1,994,334.70						
Research & Evaluation	\$	61,447.99						
Total Budget Spent	\$	2,055,782.69						

Table 3.5 - Overall 2011 Direct Low-Income Weatherization Expenditures

DSM Variance Account

The DSM Variance Account provides a budget true-up mechanism to rebate ratepayers at year end for unused budget allocation or to recover from ratepayers additional costs incurred for DSM programs. As currently defined, the recovery of such excess spending is limited to 15% budget over the OEB approved DSM Plan budget per the OEB Decision with Reasons. In addition, the Company may only recover the funds captured in the account if it has achieved 100% of its forecast energy savings, which is its volumetric savings target. All additional funding must be utilized on incremental program expenses including market transformation programs. Union accessed the DSMVA budget in 2011 as the 100% target was surpassed.

A breakdown of spending by program is contained in Appendix B. Specific details on program savings, participants, ⁶ and costs by sector are outlined in the next three sections of this report.

⁶ Participant counts are equivalent to the number of measures installed for each program

4. Residential Market

Residential programs accounted for 4% of all DSM TRC in 2011, contributing 3.347 million m³ of savings, and a net TRC of over \$15 million. Direct program spending in the residential market was \$2.699 million.



Figure 4.0, Results by Sector (Percentage)

The residential sector delivered natural gas savings through the home retrofit program in 2011, results for which are summarized in Table 4.0.

Residential	Net TRC	Natural Gas Savings (m3)	Units	Expenditures	Do	TRC per Ilar Spent
New Home Construction	\$ 31,132	5,417	383	\$ 2,481	\$	12.55
Home Retrofit	\$ 15,073,949	3,341,163	331,538	\$ 2,696,840	\$	5.59
2011 Results	\$ 15,105,081	3,346,580	331,921	\$ 2,699,321	\$	5.60
2010 Results	\$14,666,627	2,967,279	296,792	\$ 2,888,286	\$	5.08
2009 Results	\$26,073,066	4,515,861	363,922	\$ 2,838,449	\$	9.19

Table 4.0 - 2011 Residential Program Results

*Expenditures include program and incentive costs

Energy Savings Kits (ESK) are the largest driver of TRC in the residential portfolio with a total of 87,214 kits delivered in 2011 (see Table 4.2 for details).

4.1 **Program Framework**

Residential programs are designed to achieve savings related to space and water heating for Union Gas' residential individually metered residences. These programs are marketed to residential customers and are delivered through a variety of channels, including retail partnerships, builders, and third party delivery agents. New partnerships as well as working with existing trade allies, partners, and direct-to-customer promotions are strategically developed to cost-effectively promote energy efficiency within Union's residential customer base.

This section outlines the programs available to residential customers in 2011, including program changes, existing initiatives and delivery methods employed.

4.1.1 New Initiatives in 2011

Small Cities Radio & Newspaper Campaign

In 2011, Union Gas implemented radio and newspaper campaigns for customers living in smaller towns/cities who do not receive the same frequency of messaging with regards to ESKs or the same level of opportunity to visit a pick-up depot/location as those customers living in larger urban centres. Historically, most direct mails and retailer events have targeted larger cities where higher take-up can be generated. Due to the increased level of penetration in these larger urban centers, Union Gas developed a marketing campaign to target these smaller cities to create program awareness and to drive activity take-up. This campaign was piloted in select small cities in order to test the effectiveness of direct mail, newspaper and radio.

Radio Ad Script:

Did you know that Union Gas is giving away FREE Energy Saving Kits? That's right! Valued at \$60 dollars, the kit includes an energy-efficient showerhead, aerators and pipe insulation. Installing it will instantly reduce your water use, water heating costs, and help you save up to one hundred dollars a year on your energy bills!

Tag: To order your FREE Energy Saving Kit or to find a pick-up location near you go to uniongas.com/esk. Residential customers only. One per household... While quantities last. Some restrictions apply.

The above 30 second radio ads were aired in the following communities:

- Bracebridge/Gravenhurst
- Brighton
- Iroquois Falls
- Saugeen Shores

Newspaper ad Artwork:



Figure 4.1, ESK Newspaper Ad

The newspaper campaign was featured in local publications across several small communities with a total circulation of over 46,000. The publications that featured this campaign include:

- Gazette (East Zorra-Tavistock)
- Chronicle (West Elgin)
- Progress (Atikokan)
- Topic (Petrolia)
- Forester (Huntsville)
- Journal (Prescott)
- Independent Express (Elmira/Woolwich)
- Shoreline Week (Tecumseh)

News-Canada Radio Campaign

As ESKs saturate the market, it is becoming more and more challenging to reach those "hard to get" customers who might be interested in receiving the kit but who may not have heard of the program through existing outreach strategies.

To try and reach these "hard to get" customers, Union Gas piloted a radio campaign with News Canada. News Canada is an agency that provides Canadian media outlets with ready-to-use copyrightfree news content for television, print, radio and web. Broadcasters and editors from these various media outlets look to News Canada for stories when they have a gap in their current news line up or when they are looking for content that effectively enhances their broadcasts/publications. To leverage this channel of media, Union Gas provided News Canada with a radio interview that highlighted the benefits and savings associated with installing an ESK.

This approach was very successful. In the month of November alone, the campaign saw 25 radio stations from different cities 'pick-up' the radio ad/ interview – which amassed more than 1 million impressions in just one month.

Green Impact Guelph (GIG)

In 2011, Union partnered with City of Guelph, Guelph Hydro and Guelph Environmental Leadership (GEL) to launch the Green Impact Guelph (GIG). GIG is a delivery strategy that offers a free personalized in-home basic audit, completed by GEL. The audit aims at identifying water and energy saving opportunities and conducts retrofits on-site where appropriate and specifically the installation of ESK components. A pilot was launched October 2011 with a target of 250 home visits in Guelph's Hanlon Creek neighbourhood over a six month period ending March 2012.



Figure 4.2, Green Impact Guelph Program Overview

GIG Promotion and Marketing

The GIG pilot program is promoted using flyers, posters, door-to-door hangers and through collaboration with local neighbourhood groups and community groups/institutions (i.e. schools, churches, etc.). During the pilot phase, all promotions focused solely on the targeted neighbourhood and did not include the broader community.

To be eligible, a participant must be:

- A resident of a detached, semi-detached or townhouse/row-house located in the city of Guelph constructed prior to 1996, with permission from the owners;
- Be serviced by city of Guelph municipal water & wastewater system, Guelph Hydro Electric Systems Inc. and Union Gas.



Figure 4.3, Sample of GIG Marketing Material

Posters were used at workshops and community events to inform residents about the program and generate interest.

New ESK Box

In keeping with the environmental messaging we send to our customers, Union elected to replace existing plastic ESK box with a recyclable cardboard box.





Figure 4.4a, Plastic ESK Box

Figure 4.4b, New Cardboard Box

Replacement Showerhead Measure

In 2011, Union began to track ESK uptake from previous program participants since their older, less efficient version had a higher Gallon per Minute (GPM) factor than the model currently offered. Savings associated with these 4,695 replacement showerheads are included in the program results using a 2.0 GPM showerhead as the base case.

4.1.2 Existing Initiatives

Energy Savings Kit (ESK)

ESKs have been distributed to Union's residential customers since 2000. ESKs are pre-packaged measures designed to reduce a customer's energy demand and water consumption, as well as provide information on the efficient use of energy. In 2011 Union continued use of a 1.25 GPM showerhead as a component of the ESK offering. The 1.25 GPM showerheads are not sold at retail outlets in Ontario and were manufactured as a special order for Union with high quality chrome casing aesthetics. The 2011 ESK consisted of:

- Energy efficient showerhead (1.25 GPM)
- Energy efficient kitchen aerator (1.50 GPM)
- Energy efficient bathroom aerator (1.50 GPM)
- Pipe wrap (two 1 meter lengths)
- 1 roll of Teflon tape for ease of showerhead installation

- ESK Installation Guide, (see Figure 4.5a, 4.5b, 4.5c)⁷
- \$25 Programmable Thermostat coupon



Figure 4.5a, 2011 ESK Installation Guide (front view)



Figure 4.5b, 2011 ESK Installation Guide

⁷ The installation guide also directs our customer to an installation video on our website at <u>uniongas.com</u>



Figure 4.5c, 2011 ESK Installation Guide (reverse view)

Union Gas delivered ESKs to franchise customers through a variety of delivery methods; results for each are shown in Table 4.1.

Table 4.1 - 2011 ESK Summ	nary of Delivery by Ch	າannel
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more energy saving kits than the 72,000 ESKs in 2010.

Residential Account Managers	Orders/Pick Up Depots	Market Driven	Conversion	HVAC / 3rd Party Program Install	HVAC / 3rd Party Program Distr	Builder Install	Total
6,789	58,931	5,552	7	583	15,256	96	87,214

In 2011 a total of 87,214 ESKs were distributed in Union's franchise area. This is approximately 15,000

Retailer ESK Distribution Events:

2011 ESK Results by Delivery Channel

Over the last five years Union Gas has hosted ESK Distribution events in partnership with The Home Depot at various store locations across Union's franchise in the spring and fall. In 2009 Union Gas launched a pilot with Rona Home Hardware. In 2011 Union continued working with Home Depot and Rona and expanded these types of events to include Lowes. Union launched more than 30 distribution events in cities such as Milton, Guelph, Waterloo, Belleville, Sault Ste Marie, London, Burlington, Oakville, Windsor & Hamilton throughout 2011. Retailers view Union Gas as a key partner in advancing their customer's awareness and uptake of energy efficient products and contributing to their corporate energy conservation and environmental stewardship profiles.



Figure 4.6, 2011 ESK Packaging (Branded Per Distribution Event)

Radio Campaigns

Union Gas launched a series of radio campaigns to support retailers' events like Home Depot, Rona and Lowes. The radio ads generated greater awareness on the benefits and cost savings associated with the installation of the ESK. The ad also directed customers to pick up the kit on a specific date from a specific location. The campaign was successful as there were increased customer visits to the retailers' stores to receive the kit. Example of the script below:

<u>Ad Script:</u> Did you know that this Saturday, Union Gas is giving away FREE Energy Saving Kits? That's right! Valued at \$60 dollars, the kit includes an energy-efficient showerhead, aerators and pipe insulation. Installing it will instantly reduce your water use, water heating costs, and help you save up to one hundred dollars a year on your energy bills.

Tag: Pick up your FREE Energy Saving Kit this Saturday only, at xxxxx from 9 to 3. (While quantities last. Some restrictions apply.)

Direct Mail Campaigns

In 2011 Union continued to launch direct mail campaigns targeting customers who had not yet received an ESK. By working with the DMTI (Desktop Mapping Technologies Inc) dashboard, Union was able to generate a database of customers who had not received an ESK in the past as well as eliminate low-income potential customers.

The direct mail provided information on the components of the ESK as well as how to receive one (online, pick-up depots, mail back coupon). More than 350,000 direct mail letters were sent out covering over 30 cities and municipalities in Kingston, Hamilton, Thunder Bay, Milton, Trenton, Guelph, Quinte West, Nappanee, and Belleville. The direct mail resulted in the distribution of approximately 14,000 ESKs (equating to a 4% direct mail response rate).



Figure 4.7, Direct Mail

New Home Construction Energy Saving Kits (ESKs)

In 2011, Union continued with the new home construction program working with Mattamy, Empire and other large home builders in Union's territory. Once the home was built and transferred to the homeowner, the builder's Warranty Specialist would complete a final inspection and install a showerhead, kitchen aerator and bathroom aerator. A promotional "door hanger" was also placed on the showerhead which explained the cost savings of the showerhead as well as providing additional energy saving tips for the homeowner.

In 2011, Union tracked the following installations:

- 234 Bath faucet aerator
- 53 Kitchen faucet aerator
- 96 Showerheads



Figure 4.8, New Build ESK "Door Hangers" (front and reverse view)

Residential Account Manager ESK Distribution:

Since program inception, regional Union Gas Account Managers have been working with local ESK distribution channels. These local ESK channels are in addition to the mass marketed ESK events. Examples of local events include home shows, trade shows, business partner sales events, community events and 'local' promotions. In 2011 Union Account Managers distributed approximately 5,500 ESKs in their territories.

HVAC Partnership Initiative

Designed to influence energy conservation decisions at the point of purchase, incentives are paid directly to the HVAC partners for the promotion, sale, and installation of an energy efficient measure through the HVAC Partnership. For 2011 the following incentives were available to qualified HVAC partners:

- \$20 for the distribution of an energy saving kit to a qualified Union Gas customer;
- \$40 for the installation of an energy saving kit to a qualified Union Gas customer;
- \$25 for the sale and installation of a programmable thermostat.

The result of these HVAC partnership initiatives in 2011 amounted to 600 ESKs installed and more than 13,000 ESKs distributed. Those partners participating in the ESK installation component of the program also qualified to apply for incentives for installing programmable thermostats. HVAC partners were instructed that only sales to customers replacing a manual thermostat were counted as valid participants in the programmable thermostat offer.

Pick-up Depots Partnership Initiative

Union Gas continued to partner with strategically located retailer stores within its franchise area that served as a distribution arm. Examples of these stores are Home Depot, Sears as well as some HVACs who own a showroom. Although no financial incentives are offered to these depots, the promotional materials via bill inserts provided to Union's 1.1M residential customers directly led to increased traffic in retailer stores. In 2011, pick-up depots distributed more than 17,500 kits.



Figure 4.9, Pick-up Depot Promotional Material

Programmable Thermostat

In 2011, Union promoted a \$25 on-bill rebate (Figure 4.10) for the purchase and installation of a programmable thermostat to its customers. This rebate, offered in the form of a coupon, was distributed through a number of channels:

- Bill inserts distributed to all Union residential customers
- ESK insert
- Home Depot, Lowes and Rona
- HVAC dealers
- Union Gas website



Figure 4.10, Programmable Thermostat: Bill Insert

Coupons were also provided to Home Depot and Rona as a form of promotion to their customers. Residential Account Managers maintained and monitored coupon inventory levels and refilled stock. In order to receive the on-bill rebate customers had to submit their active Union Gas account number on the completed coupon along with a copy of the bill of sale. Only coupon participants who indicated they were replacing a manual set- back thermostat were eligible to participate in the program.

4.1.3 Education and Awareness Efforts

While education efforts in the residential sector do not generate TRC, affecting consumer decisions relating to the benefits of DSM through awareness is crucial to gaining, and not losing, ground. Union targets educational outreach to customers to empower them to manage their energy costs. In 2011, Union continued to couple the promotion of existing TRC positive measures with educational tools such as the Wise Energy Guide. Union will continue to develop creative methods to make energy conservation education more effective.

In 2011 Union Gas continued to disseminate educational materials to inform customers and trade allies about energy efficiency through a variety of media:

- Interactive website
- Wise Energy Guides (WEG)
- InTouch monthly bill inserts
- Bi-Annual Residential HVAC Newsletter
- Energy conservation ESK events

Residential Energy Efficient Website

Energy Efficiency, environmental stewardship and conservation are a central focus of the Union Gas website. Within the residential section of the site, a dedicated <u>Energy Conservation</u> menu heading (<u>uniongas.com/energyefficiency</u>) has been created through which the following sub-sections can be viewed:

- (a) <u>Energy Saving Programs</u>: Information and links to Union's different conservation initiatives (e.g. ESK, Drain Water Heat Recovery (DWHR), and the programmable thermostat rebate).
- (b) <u>Education</u>: Information and links on buying a new home, energy efficient labels and a downloadable Wise Energy Guide.
- (c) <u>Industry Links and Programs</u>: Information on Union's major partners, stakeholders and affiliates as well as links to conservation-related programs, both gas and non-gas focused, in the Ontario marketplace.
- (d) <u>Manage My Bill</u>: 12 easy steps to help customers reduce their energy consumption and save money on their utility bill.
- (e) Engee's Kids: Child-friendly section explaining natural gas, its use and how to conserve it.

Features on the site include:

- Online videos (topics include: the ESK, air sealing, and programmable thermostats)
- A downloadable programmable thermostat rebate coupon
- Downloadable educational materials
- Comparison tools on energy costs
- A listing of upcoming ESK events held by Union Gas
- A listing of ESK depots across Union's territory that customers can visit in order to pick-up a free kit
- An online order form for customers to request an ESK and have it delivered to their home
- An overview of energy efficiency rebate programs offered in the province, as well as links to third party organizations involved in energy conservation.

In 2011 alone, the energy conservation section of the residential website received almost 90,000 unique visitors and 260,000 page views. Those that visited stayed for an average of approximately six minutes and almost half returned for a recurring visit. These results clearly indicate that the content provided on the website is both informative and relevant to customers.

MyAccount

Launched in 2008, MyAccount is Union's online account management system for residential and small business customers (Figure 4.11). After logging into MyAccount, customers can assess personalized tools to help them better understand their energy use including:

- An archive containing 24 months of natural gas use and billing history
- A "compare bills" feature to graph consumption or bill amounts from two or more months

• A download feature to export energy data into a spreadsheet or energy management software

The synergies of these tools provide customers with feedback that can:

- Break "bad habits" related to energy use and form new, persistent habits
- Build a greater understanding of how actions/behaviours relate to energy consumption
- Influence motivations related to the use of energy



Figure 4.11, MyAccount

Wise Energy Guide (WEG)

In 2011, Union continued to distribute copies of the Wise Energy Guide (Figure 4.12). The guide includes up-to-date information on code changes, tips and solutions to reduce heat loss, manage bills, and an easy-to-use checklist to assist customers achieve energy efficiency in the home. The primary distribution method is Union's website, where customers can view a digital copy or order a printed version to be delivered to their home.



Figure 4.12, Wise Energy Guide

InTouch Monthly Newsletter

Union continued to distribute the monthly InTouch Newsletter in 2011 both in print (included as a bill insert) and online at <u>www.uniongas.com/residential/eflyers/</u>. These newsletters include educational messages related to residential energy efficiency (Figure 4.13). The messaging in 2011 included:

- The importance of regular equipment maintenance
- Tips to reduce heating and air conditioning use
- Purchasing tips for high efficiency equipment
- How to monitor natural gas consumption online
- Do-it-yourself energy efficiency improvements



Figure 4.13, InTouch Newsletter

Residential HVAC Newsletter

In 2011, Union continued to target residential Heating, Ventilation and Air Conditioning (HVAC) contractors through the GasFacts newsletter. This newsletter provides updates to the HVAC community related to Union's energy efficiency programs, codes and standards, and rebate offers from third party and government organizations, such as the ecoENERGY—HOMES retrofit program administered through Natural Resources Canada.

Dedicated HVAC Webpage

In the fall of 2011 Union Gas redesigned the HVAC partners section of the website (Figure 4.14). One goal of this targeted HVAC website is to drive further energy conservation messages and measures in the existing and retrofit markets.

Minongas A Spectra Energy Company	RESIDENTIAL - BUSINESS -	STORAGE & Search our website SEARCH Ask a question ASK
BUSINESS Home > Business >		Print
Your Account & Services Rebate and Incentives Online Calculators Industry Success Stories	Your Business Residential & Commercial Industrial HV	AC
Equipment & Tips Technical Support & Resources Energy Conservation Information & Incentives	Managing energy is a very important part of any provide energy services to our customers – and equipment, Union Gas programs for customers & information.	business and even more important to those businesses that Union Gas is here to help. We offer a information natural gas service providers, as well as up to date technical support and code
Get Connected <u>Contact Your Account Manager</u> <u>Other Businesses</u>	SPOTLIGHT! • CO Risk for Navien Hot Water Heaters Learn more • Sign up for Gas Facts by email or update your email information.	QUICK LINKS • Request For Action Form (RFA) - Get Connected -online application • Industry Links - Online resources • Calculators & Fuel Conversion tools
	TECHNICAL SUPPORT & CODE	UNION GAS PROGRAMS & CONTACTS
		For Residential customers For Commercial Industrial customers & service providers Contact a Union Gas Account Manager Email us & feedback

Figure 4.14, HVAC Webpage: www.uniongas.com/hvac

4.2 **Program Results**

The residential program contributed 3,346,580 m³ in natural gas savings with a net program TRC of \$15,105,081. As identified in Table 4.2, the greatest driver of the residential results was the Energy Saving Kit.

Initiative	2011 TRC	2011 Units	2010 Units	2009 Units	2008 Units
Energy Savings Kit	\$ 15,137,245.94	87,214	72,000	83 <i>,</i> 054	96,752
Programmable Thermostat	\$ 925,364.94	10,717	8,878	17,460	9,296
High Efficiency Furnace	-	-	-	14,246	8,407
Total	\$ 16,062,610.89	97,931	80,878	114,760	114,455

Table 4.2 - Major Residential Savings Drivers in 2011

*Program costs not included in TRC results

Union annually commissions studies, based on ESK program delivery type, to verify that homeowners install the ESK measures. Adjustment factors applied to 2011 results reflect that only those participants who install the ESK measures, and keep them installed, are included in the savings calculations. The results of these 2011 verification studies are outlined in the Verification and Evaluation section (section 9) of this report.

4.3 Program Costs

Direct program spending in the residential market was over \$2.699 million in 2011 as shown in Table 4.3 below.

Table 4.3 – Residential Program Costs

Residential	Incentives		Pro	gram Costs	Total Costs		
New Home Construction	\$	547	\$	1,934	\$	2,481	
Home Retrofit	\$1,7	41,244	\$	955,596	\$ 2	2,696,840	
Total	\$ 1,7	41,791	\$	957,530	\$ 2	2,699,321	

4.4 Lessons Learned

1. Challenge in identifying positive TRC measures for the Residential Market

The residential sector has limited measures which generate positive TRC results and the cost of delivering programs continues to rise in relation to the TRC earned. Both the continual downward pressure on achievable savings and the stricter codes and standards for energy efficiency are continuing to diminish measure opportunities for the residential market. Union's exploration of DSM measures for the residential segment has heightened since the 2009 removal of the Energy Star for New Homes program and the 2011 phase out for the high efficiency furnace measure. This underscores the unique challenge that Ontario's gas utilities are faced with in terms of identifying new viable technologies and strategies to incorporate into the residential DSM program portfolio using the TRC as a cost effectiveness screening test.

2. Education

 Education initiatives to reach the residential sector do not in themselves generate TRC. In an effort to offer this service to Union's customer base and empower them to manage their energy costs in 2011, Union continued to couple promotion of existing positive TRC measures with educational tools such as the Wise Energy Guide. Union will continue to develop creative methods to make energy conservation education more effective.

3. Leveraging the most cost effective channels

• In 2011, Union began using historical performance data to identify the most cost-effective channels and for ESKs and refine the delivery channel mix accordingly.

4. Combining multiple forms of advertising for better results

 Union has found that spreading its advertising budget over several mediums works more effectively than concentrating on one. For example, Union has found that radio advertisements paired with radio and newspaper ads is the most effective means to promote ESK retail events and has applied this learning to other campaigns.

5. HVAC Partnership

 In 2011, the HVAC partnership component of the program was modified in order to provide Union's HVAC partners with the option of either installing a showerhead for \$40 or distributing an ESK for \$20 as part of their service or sales calls. This dual approach and increased incentive resulted in a significant increase in distribution of ESK's through this channel. Providing additional opportunities to existing channels will help ensure the continued success of the program.

6. Installation Program

The number of kits installed by the HVAC installation program has been declining. One of the reasons is that HVACs service more or less the same customers in their territory. HVACs have previously promoted ESK to those customers and installed the kit for those customers who are interested. Union will evaluate whether continuing to run this type of HVAC program is beneficial, and will also look at focusing on other partners like municipalities (e.g. City of Guelph initiative).

7. Retailer Event Greeters

In fall of 2011, Union tested, for the first time, hiring greeters to promote ESK in the retailers' events (ex: Home Depot and Lowe's). The greeters' responsibility was to assist the residential account managers in engaging walk-in customers and explaining to them the benefits and cost savings associated with the installation of the ESK. The greeters assisted in distributing more kits as well as educating customers on the benefits of Union's offering. Union will look to continue having greeters at all events in 2012.

5. Low-Income Market

Low-Income Helping Homes Conserve (HHC) programs accounted for 4% of all DSM TRC in 2011, equating to a net TRC of over \$15 million. Low-Income Helping Homes Conserve and Weatherization programs combined a total of 3.694 million m³ in savings. Direct program spending in the Low-Income market was \$3.785 million.



Figure 5.0, 2011 Results by Sector (Percentage)

Helping Homes Conserve

Since the HHC program launched in the fall of 2006, it has contributed to over 10 million m³ in natural gas savings and a net TRC of over \$50 million. Table 5.0 summarizes the Helping Homes Conserve program results. In 2011, the program contributed 3.179 million m³ of savings with a net program TRC of \$15.068 million, which reflects installation within 28,692 homes.

Low Income	Net TRC	Natural Gas Savings (m3)	Units	Expenditures	TR(Dollar	C per Spent
2011 Results*	\$ 15,068,454	3,179,042	123,038	\$ 1,729,178	\$	8.71
2010 Results	\$ 9,744,496	1,981,427	64,406	\$ 1,575,064	\$	6.19
2009 Results	\$13,497,387	2,746,452	87,549	\$ 2,169,521	\$	6.22
						-

*2011 Results do not include Weatherization

Home Weatherization

In 2011, Union expanded its Low-Income Home Weatherization program both to increase the number of home retrofits and to provide for deeper weatherization to low-income households. The program contributed 514,599 m³ of savings at 450 homes. The scorecard results are presented in Table 5.1 below.

Low Income Weatherization Scorecard								
Motrice Minighting	Metric Value Levels			Waight	Actual Deculto	Dowout %	Coorre	
wetrics weighting	50%	100%	150%	weight	Actual Results	Payout %	score	
Weatherization Participants	300	400	450	50%	450	150.0	75/50	
Total Natural Gas Savings (m3)	366,000	488,000	549,000	50%	514,499	121.7	60.9/50	
Overall Results					\$ 543,600	136%	135.9/100	

Table 5.1 - 2011 Home Weatherization Scorecard

5.1 **Program Framework**

Low-Income DSM programs are designed to reduce the energy burden facing low-income households. Union offers two programs for the low-income residential market: the TRC generating Helping Homes Conserve program and the revised Home Weatherization program. Helping Homes Conserve provides low-income customers with basic measures, while the Home Weatherization program addresses the building envelope more comprehensively. Given the changes resulting from the incremental low-income plan, the Home Weatherization program framework is described in greater detail in Section 5.1.1.

5.1.1 Incremental Low-Income Plan

On September 9th 2010, the OEB outlined expectations that Union would file an incremental Low-Income Plan with additional funding if required. Union filed and received approval for the incremental plan (EB-2010-0055) in late 2010 which allowed for an additional \$2.465 million of available funds for low-income activity in 2011.

The additional \$2.465 million in program spending was directed exclusively to the Low Income sector for the Home Weatherization program. With \$1.65 million allocated to target driven activities and the remaining \$0.815 million allocated to program development activities including: the addition of a basic audit in the Helping Homes Conserve program, research, data analysis, marketing and outreach, and education.

Incentive Impacts:

The incremental plan included a shift to a scorecard approach for measurement based on two equally weighted metrics: weatherization participants and total natural gas savings. Under this scorecard model, a maximum incentive of \$600,000 could be achieved if the program reaches 150% of the overall scorecard performance level.

Screening Impacts

The TRC threshold used to screen potential upgrades was lowered to 0.7 for the Home Weatherization program. In addition, screening for this program was to be done at a household level as opposed to requiring TRC screening at a measure level (i.e. requiring basement insulation to be screened separately from attic insulation in the same home). The participant criteria was also increased to allow customers who have an income which is at or below 135% of Statistics Canada's pre-tax, post-transfer Low-Income Cut-Off (LICO) to be eligible for the program.

5.1.2 New initiatives in 2011

Partnership with the Ontario Non-Profit Housing Association (ONPHA):

Union Gas partnered with the Ontario Non-Profit Housing Association (ONPHA) in 2011 by placing advertisements in their bi-monthly newsletter, *Quick Connections* to advertise Union's applicable energy conservation programs to eligible Social and Assisted Housing Providers. Moreover, Union sponsored the ONPHA regional meetings in the following regions in order to further promote these programs: Hamilton, London, Windsor and North Bay. Union found that these channels were an effective means of educating social and assisted housing providers on the cost benefits of Union's energy conservation programs for multi-unit properties in the affordable housing market in order to drive installation appointments.

Conservation Demand Management (CDM) Collaboration - Hydro One Partnership:

In April of 2011, Union Gas partnered with Hydro One to deliver a collaborative basic measure program in Owen Sound and Timmins. Eligible Union Gas and Hydro One customers were offered free energy saving measures including the free installation of energy-efficient showerheads, pipe wrap, a programmable thermostat and up to four Compact Fluorescent Lights (CFL's). Bathroom and kitchen aerators and a power bar were left behind for self-installation. To be eligible, the recipient had to be an active Union Gas or Hydro One customer, be on a fixed or limited income, and pay their own gas and hydro bill.

Union gained valuable experience and insights in partnering with an electric utility. In addition to program management and administration, outreach requirements and customer intake, Union also acquired knowledge of the CDM measures and how they could be paired with DSM measures to maximize customer value. This partnership allowed for the delivery of a collaborative CDM/DSM program and was successful in providing 609 customers with a multi-fuel treatment of basic measures in their home. Union will continue to build on this experience as we work with other electric utilities to deliver conservation programs in the future.

Revised Home Weatherization - Incremental Low-Income Plan:

In 2011, Union expanded its Home Weatherization program both to increase the number of home retrofits and to provide for deeper weatherization to increase the average volume of natural gas conserved per home.

Basic Audit:

Union worked to develop a pre-screening process in the form of a basic audit throughout 2011 with the intention of recruiting eligible participants from the Helping Homes Conserve program into the deep-measure Home Weatherization program. This pre-screening concept was continuously improved upon throughout 2011 as the Low-Income team consulted with delivery agents to determine the most effective means to implement this process in the field. This concept will be revisited as Union transitions away from the Helping Homes Conserve program in 2012.
Segmentation Research Initiative:

The primary objective of the 2011 low-income research was to identify key market differences across major geographic locations. Union hosted a mix of focus groups and in-depth telephone interviews with social service agencies in London, Hamilton, Windsor, Sudbury, Chatham, Kirkland Lake, New Liskeard and Cobalt. This research provided Union with invaluable information about how low-income customers interact with social service agencies in the community and how their behaviours vary between the North and the South.

Data Analysis:

Union contracted DMTI (Desktop Mapping Technologies Inc) to conduct data analysis on low-income customers to accurately identify homes and neighbourhoods with high probabilities to meet the Weatherization program's eligibility criteria. Various data points were examined, including demographic information of residents, consumption history and LICO propensity. Union also acquired licensing rights of Property Data from Municipal Property Assessment Corporation (MPAC) in order to look at core property attributes including age of home and size of home. These data points were overlaid to develop a customer index. This information provides Union the ability to appropriately target neighbourhoods that meet both the income and cost-effectiveness criteria.

Marketing and Outreach:

Union produced several printed marketing materials for the Weatherization program, including a four-panel brochure for end-use customers and a sell sheet for property managers. The weatherization web page on uniongas.com was updated to include registration functionality. Union also began producing weatherization videos to support customer understanding of the program.

Education:

Union ran a "Lunch and Learn" session in November of 2011 that targeted tenants of Hastings County Housing that had their home retrofitted through Union's Weatherization program. Participants were educated on the retrofit work that was done in their home and shown low-cost and no-cost ways to further reduce energy costs in the home without sacrificing comfort. Each participant was provided with a free weatherization kit and education literature in order to drive behavioural changes and encourage tenants to continue practising conservation after measure installation has been performed.

Evaluation Study:

An evaluation study was envisioned as part of the Low Income Incremental Plan. In an effort to define the intention and scope of study Union consulted with the Low-Income Working Group to outline next steps. At this juncture, next steps include an information exchange with Union's Home Weatherization delivery agent and the Low-Income Working Group which will take place in 2012.

5.1.3 Existing Initiatives

Helping Homes Conserve

Union continued to deliver the basic measure Low-Income program Helping Homes Conserve (HHC) across 43 communities. This program offered low-income customers the free installation of energy-efficient showerheads, pipe wrap, and a programmable thermostat. Bathroom and kitchen aerators were left with the customer for self-installation.

This program was targeted to customers who had an income at 135% or below the Statistics Canada pre-tax, post-transfer Low-Income Cut-Off (LICO).

To qualify for the program, customers had to meet the following criteria:

- Pay own Union Gas bill (unless a tenant is residing in social housing)
- Live in an individually metered low-rise dwelling or Part 9 building (three stories or less)
- Have a gas-fired water heater (for energy-efficient showerhead & aerator)
- Have a gas-fired furnace (for programmable thermostats)

Union's main approach to delivering HHC was through a targeted neighbourhood strategy. A target list of low-income customers was developed through third party postal code data that identified neighbourhoods with a high propensity of low-income residents. These postal codes were then crossreferenced against Union's internal customer data and target lists were created. To ensure the privacy of customers, customer names were never used on any marketing materials and were never supplied to Union's third-party installation contractor, Eco-Fitt. Instead, homes were always identified by address only.

Prior to a technician entering a neighbourhood, the identified customers were sent a direct mail awareness package providing information on the program benefits and notifying them that a technician would be visiting their neighbourhood in the next few weeks. Customers then received a notification flyer two to three days prior to a technician's visit to remind them that personnel would be in the neighbourhood performing installations. Technicians would then visit the homes offering customers installations and/or schedule for an installation at a more convenient time. Once the installation was completed, the customer would sign an acknowledgement form and receive a programmable thermostat instruction sheet and education guide which includes low cost energy conservation tips tailored to low-income customers. If a customer was not home, a door hanger would be left behind to let them know a representative offering HHC measures had visited and to encourage them to call the toll free number provided or visit the web to book an appointment.

Home Weatherization Program

In 2011, Union continued to deliver the Home Weatherization program to low-income customers residing in Windsor, and expanded the program to the Hamilton, Belleville and Trenton areas. This program offers low-income customers with a free home energy audit and building envelope upgrades, including: attic insulation, wall insulation, basement insulation and draft-proofing measures. The upgrades performed in the home were determined by the results of the home energy audit. Once the installation of measures was complete, another energy audit was then performed to assess the actual energy savings realized by the upgrades.

In 2011 Union built on the momentum gained in Windsor from the previous year and partnered with both Windsor Essex Homes and Windsor Homes Coalition. Union expanded the program to the Hamilton and Belleville/Trenton areas, working with City Housing Hamilton and Hastings County Housing respectively. In Hamilton, Union hired an ambassador to work with EnviroCentre in managing the customer experience of the Home Weatherization program. This individual was responsible for helping to prescreen homes, set process expectations with customers and deliver notices of upcoming audits and contractor visits. The role of this ambassador was crucial in gaining traction and building an infrastructure for the Home Weatherization program in Hamilton.

The expansion of the program into the Belleville and Trenton area proved to be very successful as it enabled program delivery within a new area of Union's franchise and gave Union more experience weatherizing single detached residential dwellings, townhouses and duplexes. It also allowed Union to grow capacity with our delivery agent, EnviroCentre, by developing delivery capabilities in the Belleville and Trenton areas.

5.1.4 Education and Awareness

In 2007, Union recognized that there was a need not only to provide conservation programs directed to low-income customers, but also to educate customers on the direct benefits of energy-efficient behaviour. Union also learned that there was a lack of awareness amongst low-income customers and stakeholders on conservation programs available to them. To address these issues, Union added an education and awareness component to the HHC program.

Education Guide

To provide further value to customers after installing the measures as part of the HHC program, Union provided each customer with an education guide specifically tailored to low-income customers that outlined low-cost and no-cost energy reduction tips for the home. Union utilized the services of an expert energy consultant to improve and revise the content of the Energy Saving Guide. The guide included energy tips for home heating, water heating, windows, doors & weather stripping and lighting. Every customer who participated in the HHC program or attended an energy clinic received an education guide with their installation.

Education Clinics

In 2011, Union hosted a total of twelve education clinics in collaboration with social service agency partners in London, North Bay and Windsor that reached approximately 190 participants; a 55% increase from the participation in 2010.

A local Union Gas Account Manager hosted each session and spoke to the attendees about various ways that they could save energy in their home. Attendees were encouraged to try out some of the products that were discussed, such as caulking and applying window film. A mock window was available at every session for the attendees to practice on.

By hosting an interactive session which allowed the attendees to try out the products, Union was able to provide customers with the knowledge and comfort level to perform these applications in their

home. At the end of the session, customers were provided with some home weatherization products such as caulking, window film and weather-stripping for installation in their home. These products were not distributed for TRC generation but rather as an added-value for those who took the time to attend the clinic. Union also provided education materials including the Energy Saving Guide and the Helping Homes Conserve program brochure.

Local Partnerships

Establishing local partnerships in the community is critical to the success of low-income programs. These partners have extensive knowledge, experience and understanding of low-income issues, the neighbourhoods and needs of the residents. They also have trusted relationships with numerous lowincome customers. To bring further awareness of Union's program to low-income customers, Union partnered with various organizations in the communities to help deliver its message and build awareness of the 2011 programs. Union partnered with the following agencies as of 2011:

Hamilton

- Housing Help Centre
- Neighbour to Neighbour
- The Immigrant Women's Centre
- City Housing Hamilton

Windsor

- The Corporation of the City of Windsor, Housing & Children's Services
- Windsor Essex Housing Corporation
- Windsor Homes Coalition
- Youth and Family Resources Network
- United Way Windsor

Sudbury

• The Red Cross, Housing Division

London

- The Salvation Army of London
- Municipal Housing, London
- Families First
- LIFE*SPIN
- London Urban Services Organization (LUSO) Centre
- Intercommunity Health Centre
- Beacock Branch Library
- East London Branch Library
- Sherwood Branch Library

Cornwall

- Cornwall & Area Housing
- EnviroCentre
- Family Counselling Centre

North Bay

• North Bay Area and Social Planning Council

Brantford

• The Corporation of the City of Brantford, Social Housing

Dundas

• Dundas Community Services Centre

Cambridge

• Langs Farm Village Association

Belleville/Trenton

• Hastings County Housing

These partners have been invaluable in generating awareness for the program by distributing Union's program brochures, speaking to their clients about the program, and by allowing Union to host education clinics for their clients.

5.2 **Program Results**

Helping Homes Conserve

The Helping Homes Conserve program contributed 3.179 million m³ of savings with a net program TRC of \$15.068 million. The increased geographic reach and expansion of infrastructure allowed the program to see an increase in the number of customers that participated in the program in 2011 compared to 2010 (see details in Table 5.2).

Measure	2011 Units	2010 Units	2009 Units			
Energy-efficient Showerhead	28,692	14,384	20,061			
Kitchen Aerator	28 <i>,</i> 866	14,508	18,478			
Bathroom Aerator	28,866	14,443	18,478			
Pipe Insulation	28,910	14,542	18,667			
Programmable Thermostat	7,704	6,395	11,790			
Weatherization	450	134	75			

Table 5.2 - Helping Homes Conserve Total Participant Summary

* The Home Weatherization program results are tracked separately from the HHC program

Home Weatherization

Union surpassed the 100% of the performance metric, reaching an incentive payout of \$543,600 in 2011. Table 5.3 outlines the results achieved in the incremental Low Income Weatherization program in 2011.

Table 5.3 - Low Incom	e Weatherization Scorecar	'n
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Low Income Weatherization Scorecard							
Motrice Weighting	Metric Value Levels			Maight	Actual Deculta	Devent %	Coore
Metrics weighting	50%	100%	150%	weight	Actual Results	Payout %	Score
Weatherization Participants	300	400	450	50%	450	150.0	75/50
Total Natural Gas Savings (m3)	366,000	488,000	549,000	50%	514,499	121.7	60.9/50
Overall Results					\$ 543,600	136%	135.9/100

5.3 Program Costs

Helping Homes Conserve

Direct program spending in the low-income HHC program in 2011 was just over \$1.729 million, below the planned expenditure of \$1.903 million outlined in Section 3 of this report.

Home Weatherization

Low-income weatherization expenditures in 2011 equalled approximately \$2.056 million, which is \$0.409 million less than the allocated budget from the incremental plan. Table 5.4 outlines the 2011 expenditures for the Low-Income weatherization program.

Low-Income Initiatives	2011	Incremental Spend
Weatherization Program		
Measures/Audits and Program Administration	\$	1,662,139.99
Marketing and Education	\$	41,872.69
Data Analysis	\$	290,300.00
Basic Audit		N/A
Other	\$	22.02
Weatherization Program Subtotal	\$	1,994,334.70
Research & Evaluation	\$	61,447.99
Total Budget Spent	\$	2,055,782.69

Table 5.4 - Low Income Weatherization Expenditures

5.4 Lessons Learned

1. Partnership Development

Continuing to foster and develop local partnerships within the community is key to providing access to information on low-income customers, promoting the program to their clients/contacts, and gaining trust within the community. Partnerships included property management firms, Social Service Agencies, Social Housing and Assisted Living Agencies and municipalities, a top down approach that engendered greater program traction.

2. Expansion of Service Provider Capacity within Franchise Area

Union was successful in achieving strong results in 2011 for both the Helping Homes Conserve and Home Weatherization program largely due to the expansion of service providers within Union's franchise area. The increased capacity of Union's delivery agent, Eco-fitt, allowed the Helping Homes Conserve program to be delivered in 27 new communities in 2011 for an overall reach of 43 communities. Union's Home Weatherization delivery agent, EnviroCentre, drove the expansion of this program to new municipalities in 2011 such as Belleville, Trenton and Hamilton. This was accomplished by sourcing local energy auditors and retrofit contactors in each municipality that could implement the program effectively.

3. Program Development Activities

Union was challenged in completing some of the program development activities that were set out under the incremental low-income plan. While Union was successful in completing projects for market segment research and data analysis as noted in Section 5.1.1, other activities around education, marketing, evaluation and the basic audit will be completed in 2012. For these reasons, the program did not spend all available funds relating to program development activities in 2011.

4. Enhancing Communication Tools

In order to drive greater awareness in outreach or "Lunch and Learn" sessions, Union would benefit from conducting additional outreach in order to foster participation, and opening up the session to all tenants under the partner housing provider (including those who have yet to participate). This would increase the size of the target audience, and provide the opportunity to promote Union's program to future target participants.

6. Commercial Market

Commercial energy efficiency programs accounted for 9% of DSM savings in 2011, totalling 15 million m³ in natural gas savings with a net program TRC of \$32.856 million. Direct program spending in the commercial market was just over \$4.143 million.





In 2011, Union continued to offer commercial programs in the New Build Construction and Building Retrofit markets. Commercial savings driven through the building retrofit market represented 70% of sector savings in 2011. Table 6.0 summarizes the commercial market program results for 2011.

Commercial	Net TRC	Natural Gas Savings (m3)	Units	Ex	penditures*	T I S	RC per Dollar Spent
New Building Construction	\$ 7,864,551	4,457,662	988	\$	758,616	\$	10.37
Building Retrofit	\$24,721,631	10,452,252	74,414	\$	3,384,502	\$	7.30
2011 Results	\$ 32,586,182	14,909,914	75,402	\$	4,143,118	\$	7.87
2010 Results	\$34,397,361	10,997,192	84,870	\$	3,932,266	\$	8.75
2009 Results	\$ 74,008,306	21,069,115	149,677	\$	4,637,816	\$	15.96

Table 6.0 - 2011 Commercial Program Results

* Expenditures include direct program costs.

Given the diverse nature of commercial custom projects and their importance to the overall DSM portfolio, in 2011 Union Gas continued with its quality control reviews process for custom project files as recommended during the audit of Union Gas's 2008 DSM Annual Report. Quality control management for custom projects came into effect in July of 2009 and has continued throughout 2011.

6.1 2011 Program Framework – Approach to Market

Union Gas uses a segmented approach to the commercial market based on industry type. Segmenting based on industry type means that Union approaches 'like' customers in a more harmonized way and targets each segment with more customized, relevant and valuable communications. The eleven main customer segments targeted in 2011 included: Office, Retail, Multifamily, Foodservice, Hotel/Motel, Manufacturing, Agriculture, Warehouse, Entertainment/Recreation, Education, and Healthcare. All segments were within the Commercial M1, M2, R01 and R10 rate classes. This approach allows Union to utilize existing resources more effectively to educate business customers about potential energy savings. In addition, segmenting based on industry type has provided Union with market insights, allowing better understanding of Union's commercial customer base and barriers for DSM uptake.

When targeting each segment, Union's highly skilled team of Sales Account Managers and Marketing support execute on one or more of the following approaches to market:

- **Direct Sales Approach**: With this approach, Union's Account Managers work directly with the end-user to educate them on potential options to improve the energy efficiency of their facilities, programs available to facilitate those options, and how the application process works. The direct sales approach requires working with multiple contacts within an organization as well as service providers, manufacturers and distributors who are instrumental in affecting a decision to install energy efficient technologies.
- **Mass Market Approach**: Union Gas uses a number of mass marketing techniques to target the end-use customer such as direct mails, email blasts, and advertising as well as event based marketing including tradeshows and other similar events to reach a large number of customers and channel partners.
- **National Account Approach**: Union's National Account Managers communicate and influence end-use customers using a top-down, centralized approach. National Account customers are those that have multiple property locations throughout Union's franchise area with similar design and use, such as retail chains, property management firms and foodservice chains.

Not only does Union reach and influence through the above direct sales, mass market and national account approaches, but support is also provided by a network of industry partners. These industry partners specify or install energy efficient equipment and/or directly educate or influence Union's customers to adopt natural gas energy efficient equipment. Maintaining and growing relationships with each of the following industry partners ensures that they are informed of Union's programs and that they can articulate the savings, benefits and incentives to customers.

- *Service Providers* Architectural consultants, builders, HVACs, engineering consultants and energy service companies.
- **Associations** Associations align with segment specific approach to market and provide industry insight necessary to designing programs that resonate with customers and drive action.
- **Manufacturers** Manufacturers of the technologies that Union promotes provide insight into products' key benefits, as well as an effective method to influence the market.
- **Distributors** Distributors influence the market and their contractor customers. Contractors then influence the end-use customers installing the equipment.

6.1.1 Commercial Program - 2011 Incentives

A portfolio of energy efficient technology related incentives were available to commercial customers in 2011 through the Commercial New Buildings and Commercial Existing Buildings programs. Union uses the EnerSmart Program brand platform to educate customers about, and promote the adoption of, high efficiency natural gas technologies and/or processes, as well as audits, surveys, studies etc. Union's commercial EnerSmart programs are divided into 3 types, including:

- 1. **Prescriptive Programs:** These programs have predictable energy savings based on the size and classification of the equipment. The energy savings for these measures are prescriptive in nature and have been filed with, and approved by, the OEB.
- 2. Quasi-Prescriptive Programs: These programs, also approved by the OEB, are slightly different than the Prescriptive technologies. The key difference is that the potential energy savings for these technologies are 'quasi-prescriptive' not prescriptive. This means that the majority of the saving inputs will be prescriptive; however, there will be one or possibly few inputs that need to be customized for each installation to determine the TRC value. Examples of inputs that would have to be customized for each installation/claim are: where a piece of equipment is installed (new or existing building), type of business (e.g. Foodservice or Healthcare) and size of equipment (e.g. CFM or BTU).
- 3. **Custom Programs:** The Custom program pays for surveys and studies that identify energy efficiency projects that save money and reduce natural gas consumption. The Custom program also helps fund the purchase and installation of non-prescriptive/non-quasi-prescriptive equipment that make a company more energy efficient. Given the myriad of technologies and combinations, the TRC for each project is unknown; therefore, each project requires a unique calculation of expected TRC on a project-by-project basis.

End-Use Customer Funding Strategy

In 2011, Union continued the end-use customer funding approach where the bulk of the incentive is provided directly to the end-user. This approach is simple and transparent and it ensures not only that the customer is clearly aware of Union's involvement, but also that the incentive is rewarding those who are actually making the decision and adopting the energy efficient application and/or process.

While the bulk of the incentives are offered to the end-use customer, Union has built strong relationships among the industry partners, especially service providers to help generate program awareness. In support of this information transfer, Union continues to offer a Service Provider Incentive in 2011. The Service Provider incentive offers channel partners, such as architectural consultants, commercial builders, commercial HVACs, engineering consultants and energy service companies (ESCo's), suppliers, key associations, distributors and manufacturers a financial incentive for their influence in the sale and installation of all prescriptive programs with the exception of HWC and Pre-Rinse Spray Nozzles. Table 6.1 outlines the incentive levels for the commercial technologies supported in 2011.

Table 6.1 - Financial	Incentives for	r 2011 Programs
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Prescriptive Programs	Customer Incentive	Service Provider Incentive	
		\$50	
Front-Loading Clothes Washer CEE Tier 2	\$50	ý ö ö	
Condensing Boilers	1111111111111		
Up to 299 MBtu/hr	\$250 per unit	\$100	
300 – 999 MBtu/nr	\$1000 per unit		
≥ 1,000 MBtu/nr	\$2500 per unit		
Condensing Gas Water Heater	¢100	ć c o	
1000 gal/day/tank	\$100	\$50	
DCKV			
0 - 4,999 cfm	\$1,000	¢100	
5,000 - 9,999 cfm	\$2,500	\$100	
10,000 - 15,000 cfm	\$2,000		
Destratification Fan	\$500	\$100	
Energy Recovery Ventilator (ERV)			
Healthcare & Multifamily			
New & Existing Buildings			
≤ 1,000 cfm	\$250 per unit		
> 1,000 cfm	\$1,000 per unit		
		\$100	
All non-Healthcare & Multifamily			
New & Existing Buildings			
≤ 2,000 cfm	\$100 per unit		
> 2,000 cfm	\$500 per unit		
Heat Recovery Ventilator (HRV)			
Healthcare & Multifamily	\$250 per unit		
New & Existing Buildings	çzső per unit		
Hotel/Motel, Foodservice, Retail or			
Entertainment		\$100	
New & Existing Buildings			
500 to 1,999 cfm	\$100 per unit		
≥2,000 cfm	\$250 per unit		
	1 Free Showerhead, Kitchen & Bathroom		
	Aerator/unit		
HWC – Showerheads & Faucet Aerators	+	N/A	
	\$3 installation incentive		
Infrared Heaters			
20-99 Mbtu/hr	\$50 per unit	\$100	
100-300 Mbtu/hr	\$100 per unit		
Pre-Rinse Spray Nozzle	Free	N/A	
	Free P-Stat + Free Install		
Programmable Thermostat	OR	\$15 per stat	
	Free P-Stat + \$40 install incentive	I	

Condensing Make-up Air Unit Improved efficiency units Multifamily and Long Term care	\$200 - \$1,000 per unit	
(minimum size 1,700 cfm) Efficiency units with 2-speed motors or Variable Frequency Drives All commercial segments Sizes >= 1,700cfm	\$400 - \$2,400 per unit	\$100
Laundry with Ozone Equipment	\$500-\$4,000	\$100
Cooking Equipment HE under-fired broiler Energy Star Convection Oven Energy Star steam cooker Energy Star fryer	\$100	\$50
Energy Star Dishwasher Under-counter Stationary rack Rack conveyor	\$100 \$100 \$400	\$100
Custom Project Equipment Incentives	15% of capital costs (up to \$40,000)	N/A
Feasibility Study	30% of cost (up to \$4,000)* *multisite cap of \$4,000	N/A
Steam Trap Survey	50% of cost (up to \$6,000)	N/A
Design Assistance Program	N/A	\$4,000/project
Industrial Process Study	66% of cost (up to \$20,000) N/A	

6.1.2 New Initiatives in 2011

Cooking Equipment

High Efficiency and Energy Star Cooking Equipment are 20-50% more efficient than traditional cooking equipment. Eligible equipment includes Energy Star fryers, steam cookers, convection oven and high efficiency under-fired boilers. This program was targeted to all commercial kitchen customers.

Still in its infancy, marketing efforts for this initiative included mass marketing to commercial kitchen customers through direct mail, email blast, and association newsletters, as well as a direct marketing approach to the foodservice, hotel/motel, education and healthcare segments. Union also utilized a targeted National Accounts strategy to the foodservice segment to capitalize on program uptake from the key chains within Union's franchise. Relationships with manufacturers were built and actively managed in 2011 to support awareness of Union's program and to ensure the program was being promoted to their customers.

Laundry Equipment with Ozone

The ozone laundry system is a piece of auxiliary equipment added onto a new or existing commercial washing machine which reduces the amount of chemicals, detergents and hot washing and drying times required to achieve the same standard of cleaning. Union markets this program to customers with large volumes of laundry such as hotel/motel, laundry services and healthcare segments.

Marketing efforts included promotion through a direct sales approach by collaboration with technology manufacturers to effectively reach and influence early technology adopters. Additional marketing promotion included editorial opportunities through a hotel/motel association newsletter to build awareness of this technology.

Energy Star Dishwashers

Energy Star commercial dishwashers reduce energy, water consumption and improve performance. On average they are 25% more energy efficient and 25% more water efficient than standard models. Models include under counter, door and conveyor type as well as rack-less conveyor. Union Gas markets Energy Star dishwashers to all customers with commercial kitchens via a direct sales and mass market approach which include the foodservice, education, healthcare and hotel/motel segments.

Condensing Make-up Air

Condensing Make-up Air units are indirect gas fired and provide fresh air to common areas in commercial buildings. The majority of furnaces built into rooftop units are mid-efficiency units with efficiencies ranging from 78% - 82%. Condensing technology offers improved efficiencies of 90% plus and the high 'turn down' feature results in lower operating costs, and better control and comfort.

There are three sub-categories for this technology:

- 1. Improved efficiency
- 2. Efficiency + 2 speed
- 3. Efficiency + Variable Frequency Drives (VFDs)

Condensing technology is relatively new in the marketplace. As a new technology, the adoption rate was minimal in 2011 but momentum is expected to increase throughout 2012. The marketing of this program included a direct sales approach, educational workshop opportunities to create knowledge and awareness, as well as targeted marketing materials.

Hot Water Conservation - Non Multi-family

In 2011, the Hot Water Conservation (HWC) program was expanded to non multi-family segments targeted to: hotel/motel, long term care/retirement facilities, university residences/dormitories and "other" (such as food services, entertainment, etc). This program is designed to reduce hot water consumption, and more specifically, the corresponding natural gas required to heat the water, through the installation of energy efficient showerheads and faucet aerators. Union achieved consensus with its EAC on the technical input assumptions for these offerings and additionally, conducted verification for these new segments.

6.1.3 Existing Initiatives/Offerings

The following outlines details of Union's existing Prescriptive and Quasi-Prescriptive Water and Space Heating programs in addition to Union's Custom Programs.

Water Heating Programs - Prescriptive

The technologies supported in this area include:

- Efficient Pre-Rinse Spray Nozzles
- Showerheads and Aerators (Hot Water Conservation Program)
- Condensing Gas Water Heaters
- Front Load Clothes Washers

Pre-Rinse Spray Nozzle

This technology involves a high-pressure 0.64gpm nozzle. This is the most efficient spray nozzle available in North America and can save up to \$850 per year in gas energy costs. In 2011, Union continued to deliver this program through third party delivery with Ecolab Corporation (Ecolab). Union maintained this partnership given the success achieved in working with Ecolab since 2009, and given Ecolab's presence in the foodservice segment. This has allowed Ecolab's field service representatives to both capitalize on their long standing business relationships with foodservice establishments and form new relationships across the Union franchise area to deliver this program. In 2011, a number of customers who previously participated in Union's pre-rinse spay nozzle program became eligible to replace their nozzles since their older, higher flow (1.24gpm) models had reached the end of their useful life.

Union promoted the benefits of energy-efficient pre-rinse spray nozzles through:

- direct sales approach with Ecolab (delivery partner) representatives
- mass marketing initiatives such as direct mails and email blasts
- key associations and national accounts





Figure 6.1, Pre-rinse Spray Nozzle Promotional Literature (front and back)

Hot Water Conservation Program

This program was designed to reduce hot water consumption and the corresponding natural gas required to heat the water through the installation of energy efficient showerheads and faucet aerators. Union supplied the measures at no charge to customers for self-installation. Midyear in 2011, Union introduced an installation rebate to encourage immediate installation of the HWC products and collected additional end-user information. A \$3 per product installation incentive was offered to the participants if the equipment was installed within eight weeks of shipment.

This program targeted property managers and multi-family facilities by offering a free 1.25gpm showerhead, a 1.5gpm kitchen aerator and a 1.0gpm bathroom aerator for each shower and sink contained within each unit of their building. In 2011, the HWC program expanded to non multi-family facilities including hotel/motels, university dorms/residences, long-term care/retirement facilities, and 'other' (such as food services, entertainment, etc).

In 2011, customers who previously participated in Union's HWC Multi-family program became eligible to replace their showerheads since their older models had a higher GPM factor than the current model delivered for this program.

Union continued to deliver this program through Eco-Fitt Corporation (Eco-Fitt) in 2011. Eco-Fitt was responsible for tracking and managing all orders generated by Union's mass market campaigns through Eco-Fitt's online system or by fax, mail or phone.

In 2011, Union distributed 41,571 units within the multi-family segment, a marked decline from 78,263 in 2010. As the market gets saturated, this program continues to become more challenging, however opportunities remain in the non multi-family segment for showerheads.

The Hot Water Conservation Program was promoted through:

- Mass market initiatives such as direct mails and email blasts
- Tradeshows/events e.g. Property Management Expo
- Key associations
- National Accounts approach
- Union's business website



Figure 6.2, Showerheads & Aerators Promotional Material

Condensing Gas Water Heater 1,000 gal/day/tank Program

Condensing gas water heaters are high-efficient gas water heaters that operate at 95% thermal efficiency. This thermal efficiency is higher than the conventional tank type water heaters that operate at 80% efficiency – which results in faster hot water cycle times and, therefore, reduced building operating/energy costs. This program was targeted at multifamily, foodservice, education, recreation/ entertainment and healthcare customers whose hot water usage exceeds 1,000 gallons per day. Marketing efforts included promotion through a direct sales approach, mass market initiatives (direct mails and email blasts), tradeshows/events, and key association publications.



Figure 6.3, Condensing Gas Water Heater Promotional Literature

Front-Loading Clothes Washer- CEE Tier 2 Program

Front load washers extract more moisture from the clothes, thereby reducing the time, energy and cost of drying. This program was targeted at the multifamily segment. Marketing efforts included promotion through a direct sales approach, mass market initiatives (direct mails and email blasts), tradeshows/events, relationships with key manufacturers and suppliers, and promotion in key association publications.

Space Heating Technologies – Prescriptive

Measures that fall within this category include:

- Programmable Thermostats
- Demand Control Kitchen Ventilation

Programmable Thermostats (P-Stats)

This program promoted the replacement of mercury thermostats with a P-stat. A P-stat adjusts the temperature of a building space according to a series of programmed settings that take effect at different times of the day, and different days of the week. The benefit of this is a reduction in annual heating/cooling costs by up to 10%. This program was available to all customers.

In 2011, Union continued its relationship with Eco-Fitt Corporation (Eco-Fitt) as the delivery agent for the P-Stat Program. Eco-Fitt was responsible for tracking and managing all orders generated by Union's mass market campaigns through Eco-Fitt's online system or by fax.

This program was promoted through:

- Mass market initiatives such as direct mails and email blasts
- Direct sales, where Union worked with contractors who promoted this program directly to end-users
- Tradeshows/events e.g. Property Management Expo (PM Expo)
- Key association ads, newsletters, publications
- Union's website self serve order fulfillment

In 2011, Union distributed only 3,551 p-stats. During Union's 2010 Audit, new information related to p-stat savings became available and as such Union exited this program as the offering no longer remained cost effective despite a positive TRC.



Figure 6.4, Programmable Thermostat Promotional Material

Demand Control Kitchen Ventilation (DCKV)

Traditional ventilation systems operate at only one speed, whereas the speed of demand control kitchen ventilation systems automatically respond to changes in cooking volume and heat, resulting in much greater efficiency. The prescriptive savings for DCKV were based on three ranges of total range hood exhaust: 0 – 4999 CFM, 5000– 9999 CFM, and 10,000–14,999 CFM. The midpoint of each exhaust range was used to calculate energy savings for both gas and electricity.

Union works closely with manufacturers and end use customers to promote Demand Control Kitchen Ventilation (DCKV) systems. Union's efforts resulted in 15 installations, a slight decrease from the 18 installations in 2010 as a result of the longer than normal sales cycles. In the National Accounts segment, Union marketed the benefits of DCKV through the following communication vehicles:

- Industry trade magazine advertisements
- Newsletter communication through association (ORHMA)
- Mass marketing through direct mail and email blast
- Trade show participation (e.g. CFRA)
- National Accounts Approach with foodservice chains



Figure 6.5, Demand Control Kitchen Ventilation Promotional Material

Space Heating Technologies – Quasi-Prescriptive

As described previously, the energy savings for some measures are dependent on the application and segment in which they are installed and employ an automated savings calculator. These quasi-prescriptive measures include:

- Energy Recovery Ventilators (ERVs) & Heat Recovery Ventilators (HRVs)
- Condensing Boilers
- Infrared Heaters
- Destratification Fans
- Condensing Make-up Air Units

ERVs & HRVs

The most efficient way to provide indoor to outdoor air exchange to improve air quality is with an ERV or HRV. ERVs capture heat/moisture and HRVs capture only heat. Recovered heat/energy is used to heat air entering the building, which reduces energy use and energy related costs, and makes the whole system operate more efficiently. All commercial customers are eligible for this program; however Union mainly targets healthcare and education customers.

In 2011, Union offered end-use customers \$100-\$1,000 per unit. Union did not make any major changes to the marketing of this program in 2011 and continued with promotion through:

- Direct and national account sales approach
- Key healthcare/education association ads, newsletters, publications, customer direct mails and email blasts
- Key healthcare/education tradeshows/events speaking opportunities highlighting ERVs/HRVs and customer testimonial success stories, e.g. OASBO
- Building/maintaining relationships with key service providers and manufacturers to ensure education/awareness of Union's programs, as well as promotion of the programs to their customers

Condensing Boilers

In 2011, Union continued its condensing boiler program. A condensing boiler recovers energy that would normally be discharged into the atmosphere through a flue. This improves heating efficiency by approximately 15-20% compared to a conventional boiler, resulting in reduced gas bills. It also requires less space, offering more flexibility in small space environments. All customers are eligible for this program; however Union Gas mainly targets healthcare and education customers.

In 2011, Union offered end-use customers \$250-\$2,500 per unit. Union did not make any major changes to the marketing of this program in 2011 and continued with promotion through:

- Direct and national account sales approach
- Key healthcare/education association ads, press releases, newsletters, publications and through direct mails and email blasts to their membership (Union's customers)
- Key healthcare/education tradeshows/events speaking opportunities highlighting condensing boilers and customer testimonial success stories, e.g. OASBO
- Building and maintaining relationships with key service providers and manufacturers to ensure education/awareness of Union's programs, as well as promotion of the programs to their customers
- Press releases to generate awareness and interest in this technology



Figure 6.6 Cheque Presentation Ceremony

Infrared Heaters

Infrared heaters help customers conserve energy and money, as they deliver heat directly to where it's needed instead of heating the air within a space, like traditional forced air heating systems.

Efficiency for this technology is especially evident in large volume buildings that do not require a steady state of heat or where there is a large amount of air exchange such as near a loading dock. Union mainly targeted warehouses for program participation. In 2011, Union offered end-use customers \$50 - \$100 per unit and continued with promotion through:

- Direct sales approach
- Mass marketing initiatives such as direct mails and email blasts
- Building/maintaining relationships with key service providers, distributors, contractors and manufacturers to ensure they are educated about Union's programs and to ensure they are promoting it to their customers
- Union Gas website



Figure 6.7, Infrared Heater Promotional Material



Figure 6.8, Infrared Heater Promotional Material

Destratification Fans

In 2011, Union continued the destratification fan program that was introduced in 2009 as part of the prescriptive portfolio. Destratification fans are large downdraught fans ranging from 8 to 24 feet in diameter. They offer an inexpensive and efficient way to bring heat down from the ceiling to mix with cooler floor temperature air, ensuring a consistent and comfortable temperature where it is most needed. Facilities with large stratified temperature differences have the greatest potential for energy savings; typically, the greater the ceiling height, the greater the potential for savings in the heating load.

In 2011, Union targeted warehouses and offered end-use customers \$500 per unit. This initiative resulted in the installation of 36 units in 2011, an increase from the 30 units delivered in 2010.

Marketing efforts included working with manufacturers and targeting potential customers, such as warehousing and industrial segments, via mass marketing direct mail and targeted communication. Relationships with service providers and manufacturers continued to be established and actively managed in 2011 to generate awareness of Union's program, and to ensure the program was being consistently promoted to their customers.



Figure 6.9, Destratification Fan Promotional Material

Custom Projects

Custom projects cover opportunities where energy savings are linked to unique building specifications or design concepts, processes or new technologies that are outside the scope of prescriptive and/or quasi-prescriptive programs. Trade allies in the design and engineering communities, and key commercial customers are the targeted audience for this program, which includes both incentives and educational support.

Commercial custom project incentives were harmonized with Distribution Contract incentive offerings, and set at 15% of the incremental cost; up to a maximum of \$40,000 per project (incremental cost is defined as the difference in cost between the high efficient option and the base case option). All custom projects must pass a TRC test for cost-effectiveness before being approved.

In 2011, Union continued to implement an improved quality control process for custom projects. Professional engineers review every project as they are submitted to validate the savings calculations and ensure the appropriate supporting documentation is provided. In addition, three online checklists were developed during 2010 in response to recommendations made during the 2009 Audit. Each checklist included a list of items Account Managers and /or Project Managers were requested to check for prior to submitting projects for review by Quality Control Engineers. They were intended to act as visual reminders regarding the required documentation for each project type. The following checklists were developed and incorporated within the Automated Information Management System (AIMS) in September 2010:

- Equipment Checklist for use on all equipment projects
- Study Checklist for use on all study applications with the exception of DAPs
- Education Checklist for use on all education/training applications

Design Assistance Program (DAP)

Union continued to offer incentives under the Design Assistance program to channel partners in the design and engineering communities as well as key commercial customers that are responsible for the design and management of multiple facilities. A \$4,000 incentive per project was provided to eligible participants to assist with breaking down the financial barriers associated with modeling high efficient buildings. This program demonstrated that energy efficient options beyond the building code are cost effective to developers of new buildings and operators of existing buildings undergoing a significant renovation. The DAP program was available to new buildings and existing building participants.

Feasibility Studies

Through the provision of financial support to end use customers, energy efficiency audits are conducted to analyze the efficiency of natural gas equipment, including a review of gas, electric and water use, if applicable. An incentive equal to 30% of the audit cost (up to a maximum of \$4,000) was offered for feasibility studies. Given the nature of audit programs, no savings are attributed, but participation rates are tracked and linked to future prescriptive and custom project applications.

Feasibility studies have proven to help identify future project opportunities that help maintain the focus on energy efficiency in the commercial sector.

6.2 **Programs Results**

The commercial sector delivered natural gas savings of 15 million m³ with a net program TRC of \$32.586 million through the New Buildings and Existing Buildings markets in 2011. As shown in Table 6.2 below, the largest commercial results came from the building retrofit market which represented 76% of TRC results.

Commercial Programs	Natural Gas Savings (m3s)	% of Total	Program TRC	% of Total
New Building Construction	4,457,662	30%	\$ 7,866,472	24%
Building Retrofit	10,452,252	70%	\$24,719,710	76%
Total	14,909,914	100%	\$32,586,182	100%

Table 6.2 - 2011 Commercial Results by Program

Overall, 2011 TRC results in the commercial sector were 5% lower than in 2010 mainly due to the exiting of Unions programmable thermostat offering. The two initiatives that delivered the largest savings in 2011 were condensing boilers and Commercial Custom projects, as presented in Table 6.3. Commercial Custom projects accounted for over 19% of the overall TRC, while condensing boilers represented the largest portion of commercial savings with over \$9.799 million in TRC, or more than 29% of the segment savings, in 2011.

Program	20	11 Gross TRC	2011 Units	2010 Units	2009 Units	2008 Units	2007 Units
CEE Tier 2 Front-Loading Clothes Washer	\$	935,711	1,426	103	-	-	-
Condensing Boilers	\$	9,799,434	683	598	508	318	352
Condensing Gas Water Heaters	\$	145,036	116	41	-	-	-
Custom Projects	\$	6,288,562	163	263	144	165	255
DCKVs	\$	478,675	15	18	42	20	28
Destratification Fans	\$	1,054,497	36	30	13	-	-
Dishwasher	\$	1,171,341	224	-	-	-	-
Energy Star Front Load Clothes Washer	\$	124,200	566	-	-	-	-
Food Service	\$	183,905	159	-	-	-	-
ERVs	\$	2,251,538	380	262	466	191	437
HE Furnaces	\$	-	-	-	356	140	562
HRVs	\$	1,460,593	320	183	213	50	96
Infrared Heaters	\$	3,045,030	992	656	926	931	558
Hot Water Conservation	\$	3,743,617	65,702	78,263	134,478	75,700	115,781
Make Up Air	\$	129,962	14	-	-	-	-
Ozone Laundry	\$	661,482	63	-	-	-	-
Pre-Rinse Spray Nozzles	\$	1,168,069	992	333	1,987	3,349	906
Programmable Thermostats	\$	464,330	3,551	3,911	9,320	3,307	830
Rooftop Units	\$		-	209	1,224	830	242
Total	\$	33,105,983	75,402	84,870	149,677	85,001	120,047

 Table 6.3 - Commercial Savings Drivers in 2011

Commercial Custom projects continue to play an important role in driving DSM Savings for Union, generating over \$6.289 million in TRC in 2011. Figure 6.8 displays the adjusted TRC benefits, excluding

cost, by resource type as a percentage of total TRC benefits from commercial custom projects in 2011.



Figure 6.10, Commercial Custom Projects Benefits by Resource Type

Due to the diverse nature of custom projects, verifying claimed savings of a representative sample of projects is essential to ensuring accurate results. To this end, a sampling methodology was developed by Navigant (formerly Summit Blue Consulting) in 2008 to generate optimal custom project representation for verification. Since 2008, this new stratified approach captures projects representing not only a meaningful sample of claimed gas savings, but also water and electricity savings. In 2011, Michaels Engineering was contracted to complete commercial custom project paper reviews for the bulk of the sample, as well as conduct 5 on-site verifications. Study details and results are provided in Section 9, Verification and Evaluation.

Tuble 0.4 Teasibility Ste	dole of a reasonity studies and Addits					
Facility Feasibility and Audit Participation						
2011 Studies2010 Studies2009 StudiesMeasureCompletedCompletedCompleted						
Feasibility Studies and	128	559	121			
Boiler Audits	0	0	46			
Total	128	559	167			

Table 6.4 - Feasibilit	y Studies and Audits
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6.3 Program Costs

Direct commercial program expenditures in 2011 were approximately \$4.143 million, an increase of 5% from 2010. Table 6.5 summarizes the direct expenditures for the commercial sector in 2011.

Table 6.5 - 2011 Commercial Program Direct Expenditure	able 6.5 - 2011 Commercial Program Dire	ct Expenditures
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Commercial Program	Incentives	Program Costs	Total Costs
New Building Construction	\$ 652,288	\$ 106,328	\$ 758,616
Building Retrofit	\$ 2,971,029	\$ 413,473	\$3,384,502
Total	\$ 3,623,317	\$ 519,801	\$ 4,143,118

Overall the commercial sector achieved a TRC of \$7.85 for every direct dollar spent in 2011, a decrease from the TRC per dollar spent of \$8.75 in 2010.

6.4 Lessons Learned

1. Incorporated Quality Control Recommendations into Program Procedures

In 2011, Union continued the enhanced quality control practices that were introduced in 2010, for Commercial Custom projects. As an adjunct to these efforts, Union developed third party engineering approved calculators to assess energy savings for specific commercial custom project types.

2. Identifying appropriate incentive level for new measures

It became increasingly apparent in 2011 that, in order to continue current prescriptive program traction, the programs will need to gain deeper penetration in the commercial market. Information garnered through informal research in 2011, demonstrated that capital costs for certain technologies in the prescriptive measure mix remains a barrier to program traction. In light of this barrier, Union will consider revisions to the incentive funding levels to ensure prescriptive incentive amounts are sufficient to compel customer adoption of higher efficient technologies.

7. Distribution Contract Market

Union's Distribution Contract (DC) and Commercial programs are aligned under one brand platform, the EnerSmart Program. This ensures a seamless, recognizable brand throughout Union's franchise. Unlike other DSM market segments, the DC market falls solely within the scope of custom projects.



Figure 7.0, Results by Sector (Percentage)

The EnerSmart program for the DC market accounted for 84% of total TRC results in 2011, with a net program TRC of \$323.655 million. Programs in this sector achieved 141.753 million m³ in natural gas savings. Direct program expenditures were \$8.737 million.

TRC results in the DC sector were 39% higher than in 2010, and the overall number of participants in custom projects including boiler audits and feasibility studies increased from 308 participants in 2010 to 496 in 2011. Table7.0 presents the DC market program results for 2011 and the preceding two years.

Distribution Contact	Net TRC	Natural Gas Savings (m3)	Projects	Expenditures	TR(Dollar	C per r Spent
2011 Results	\$ 323,654,850	141,753,196	496	\$ 8,736,579	\$	37.05
2010 Results	\$ 232,077,531	105,169,866	308	\$ 5,055,246	\$	45.91
2009 Results	\$ 201,056,110	64,272,873	211	\$ 5,022,108	\$	40.03

Table 7.0 - 2010 DC Results

*Expenditures include program costs

7.1 Program Framework

Given the low level of new build activity in this sector, the DC market is not differentiated into new build and existing buildings. The DC market is highly heterogeneous, with most projects tied directly to unique processes or technology requirements. Each project is validated on a stand-alone basis by a comprehensive professional engineering review and is required to pass a TRC screening process.

The EnerSmart program was designed to achieve savings in process-specific energy applications, as well as space heating, water heating and the building envelope. Account Managers market the program directly to customers and indirectly through trade allies, channel partners, Energy Service

Companies (ESCO's), engineering firms, and equipment manufacturers. Account Managers work to cost-effectively promote energy efficiency within Union's DC customer base.

The majority of projects were jointly delivered through Union's Account Managers and Technical Project Managers. Success was achieved by combining strong engineering expertise with the customer knowledge derived from established account-managed relationships. This approach is critical to influencing the market and achieving successful implementation of the program.

7.1.1 DC Program 2011 Incentives

Table 7.1 shows the incentive guidelines for the 2011 DC initiatives.

Program Element	Incentive Guideline	
Fauinment Incentive	15% of cost	
	(up to \$40,000)	
Industrial Process Studios	66% of cost	
	(up to \$20,000)	
Enormy Efficiency Ecosibility Studios	50% of cost	
	(up to \$10,000)	
Steam Tran Survivo	50% of cost	
	(up to \$6,000)	
Education and Promotion	Available upon	
	request	
Domonstration of Now Toshnologies	10% of cost	
	(up to \$50,000)	
DAP	\$4,000 per project	

Table 7.1 - Program Incentives

Equipment incentives

Union's role in promoting and implementing energy efficient options continued to help companies control energy costs and remain competitive in today's global economy. The instability of the current economic climate is a threat to the industrial customer base in Union's franchise area. With the continual focus on cost reduction, many industries lack the expertise to analyze potential energy saving opportunities. Union helps fill this gap with its reliable, knowledgeable and reputable Technical Project Managers in conjunction with incentives designed to influence equipment choices.

Industrial Process Studies

Union provided customer incentives up to \$20,000 for conducting detailed engineering analysis and designing specific process equipment or operational improvements identified with or without a general plant audit. The program worked to support performance testing and analyses of industrial boilers, total steam plants, thermal fluid heaters, vaporizers, furnaces and special process equipment. Analysis of the testing identified and quantified energy saving opportunities, cost saving opportunities, implementation costs and payback periods as well as NOx and CO_2 impacts.

Energy Efficiency Feasibility Studies

Energy efficiency feasibility studies that included an analysis of natural gas equipment as well as electricity, compressed air, water and wastewater were provided an incentive of up to \$10,000. These feasibility studies were used by Union to help customers formulate a priority list of energy efficiency projects geared to site-specific energy plans and budgets. Union also assisted the customer's technical staff in generating business cases to enable the customer to secure corporate capital funding for energy efficient equipment and/or process changes.

Steam Trap Surveys

Steam trap surveys conducted by qualified service companies were designed to reduce losses from steam distribution systems and were eligible for up to \$6,000 incentive. Each survey identified leaking, over-sized or under-sized, blocked and/or flooded traps, as well as the need for improvements in condensate return systems.

7.1.2. Education and Promotion

Customers have repeatedly told Union they find significant value in the training and educational material provided by the utility.

Union continued to expand investment in the following educational and promotional tools:

- GasWorks newsletter
- EnerSmart brochures
- EnerCase reports
- Workshops to promote the efficient use of natural gas and increase the awareness of energy saving opportunities
- Sponsorship of specific educational forums
- Promotion and attendance at independent professional development groups, trade organizations, and government workshops

GasWorks is a technology and energy conservation newsletter, designed to assist large users of natural gas to better manage their business. The newsletter not only provided links to Union's website but also various tools, calculators, an online library, and the "Ask an Expert" service provided by Union's technical resources.

Below is a summary of the most accessed articles of 2011.

- Winter Fuel Price Outlook for 2012
- Steam System Maintenance Optimization Series: Minimize Vented Steam
- Lowering Steam Pressure Reduces Energy Losses
- Direct Contact Water Heaters Rake in the Energy Dollars
- The Basics: How to Calculate Energy Savings

In 2011 Union developed one additional *EnerCase* brochure designed to assist in the education of DC customers. Union Gas also produced a steam performance brochure that communicates benefits, average savings and the information required from a custom necessary to qualify for Union Gas financial incentives.

Union's webpage, dedicated to the EnerSmart program, contains an application form, technology information, conversion calculations, technical presentations from customer meetings, and a series of links for additional references. Included in the links are the newly developed brochures and inserts, which were added to a growing library of *EnerSmart* and *EnerCase* brochures. These brochures include customer testimonials regarding challenges encountered and solutions Union helped provide (see Figure 7.1).



Figure 7.2, Website screenshot: <u>uniongas.com/business/savemoneyenergy</u>

Union hosted several workshops throughout 2011 to promote energy conservation to DC customers. These workshops were attended by 133 delegates in total. Table 7.2 provides a summary of seminars and number of participants.

Table 7.2 - 2011 Seminar's Hosted by Union

Name of Seminar	# of Participants
Calculating and Predicting Savings	97
A Hands-On Energy Management Workshop	
Monitoring, Targeting and Reporting workshop at	7
Ontario Hospital Association (OHA)	
EnerSmart for Business - Energy Auditing 101	10
Sustainable Energy Plan Workshop	19

In addition to hosting seminars, Union also showcased its program offerings and industry knowledge by attending industry meetings and tradeshows. Table 7.3 lists the meetings and tradeshows specific to large industrial customers that Union attended in 2011.

Customer Meetings and Tradeshows	Date
Large Commercial / Industrial Customer Meeting and Tradeshow (London & Burlington)	Apr 2011
Forest City Customer Meeting	June 2011
Kingston Customer Meeting	June 2011
Canadian Healthcare Engineering Society Conference	May 2011
Canadian Boiler Society Education & Training Forum	June 2011
Greenhouse Growers Trade Show and Open House Featuring Energy Efficiency Suppliers	Sept 2011
CME/NRCan Energy 2011	Nov 2011
Hot Mix Association Conference	Dec 2011

Table 7.3 - 2011 Customer Meetings and Tradeshows

Education does not stop with customer training and seminars. Union prides itself on providing highly valued energy expertise, technical support, and resources for industrial customers. As a leader in energy efficiency committed to working closely with government efficiency, environmental, and professional organizations, Union fully understands the latest trends and technologies. This is not limited to potential solutions for individual customers, but also includes the co-benefit of shared learning. Some examples of industry partnerships include:

Canadian Manufacturers and Exporters (CME)

- Union actively participated as a member of the CME Energy Committee sessions
- Sponsored/exhibited/presented at the 2010 "THINK" Sustainability Summit
- Sponsored/exhibited at the CME/London Economic Development Corporations Manufacturers Only Event

- Participated in the CME Regional Energy Forums (3) in 2010
- Submitted one editorial feature for the CME publication "Industry Matters"

Ontario Ministry of Small Business and Consumer Services

• The Ontario Ministry of Small Business and Customer Services developed a one day session to introduce small businesses in the Windsor, ON area to programs and funding sources, including Union's energy efficiency programs.

Consortium for Energy Efficiency (CEE)

Through this partnership, Union networked with efficiency program administrators from across the United States and Canada with a focus on developing common approaches to advancing energy efficiency.

Energy Solutions Centre (ESC)

• Through the ESC, Union collaborated with energy utilities, municipal energy authorities, equipment manufacturers, and vendors to accelerate the acceptance and deployment of new energy-efficient, gas-fuelled technologies.

Natural Resources Canada (NRCan)

Union's involvement with NRCan includes participation in research activities, funding of industryspecific benchmark studies, and offering Union customers assistance in obtaining government funding for energy efficiency projects. Specific NRCan programs include:

- Office of Energy Efficiency (OEE)
- Canadian Industry Program for Energy Conservation (CIPEC)
- CANMET Energy Technology Centre

<u>Other</u>

• Union also worked within Municipal Economic Development Coordinators to share information and build awareness on Union programs offerings that may benefit their constituents.

7.2 Program Results

Under the uniformed DC EnerSmart program branding, DC Custom projects continued to generate the largest contribution to Union's DSM portfolio, with a net program TRC of \$323.655 million, approximately 141.753 million m³ in natural gas savings, and direct program spending of \$8.737 million. With 496 TRC generating projects in 2011, Union's EnerSmart program saw a marked increase in uptake by DC customers.

The continued success of the DC custom program was a result of ongoing efforts over the last several years to identify and implement multi-year projects. Accomplishing an increase in DC project results despite slow economic recovery in 2011 can be attributed to increased communications, strong account relationships, and provision of technical initiatives to help customers implement shorter term projects while identifying multi-year project opportunities.

Custom Project Analysis

The DC Custom program completed 496 TRC generating projects in 2011, representing a total of 1,125 installed measures as shown in Table 7.4. While there were more DC custom projects, they were by and large of lower cost compared with 2010.

Year	# of Measures	Customer Invested Capital	Customer Capital \$/ Measure
2011	1,125	\$78,574,665	\$69,844
2010	357	\$156,265,927	\$437,720
2009	386	\$94,266,048	\$244,213

Table 7.4 - DC Custom Project Analysis

DC represents more than 80% of the DSM savings achieved across the overall portfolio; given the customized nature through which these results are generated, Union conducts a third party on-site engineering study to verify the results of a representative project sampling. Diamond Engineering provided the DC on-site custom project verification services in 2011, the sample for which was pulled by Navigant using the stratified sampling method established in 2008. The verification results are presented in Section 9 of this report.

Unlike previous years when the DC portfolio was weighted heavily by one large project, the 2011 DC projects were more evenly distributed with the largest project representing 7% of the overall DC Net TRC.



Figure 7.3, Distribution Analysis of Custom

As depicted in Figure 7.3, 20% of Distribution Custom projects accounted for approximately 78% of the TRC savings generated by this group of customers. Given the resource demands and capital

demands of DSM projects, it is understandable that customers require sizeable energy savings and reasonable payback periods in order to meet their own internal return on capital requirements to support the initial investment.

A number of these projects also had multiple resource savings, including electricity and water, however the bulk of the savings (90%) were specific to natural gas. Figure 7.4 displays the adjusted TRC benefits, excluding cost, by resource type as a percentage of total TRC benefits from DC custom projects in 2011.





Facility Audit Results

Facility audits continued as an important part of the EnerSmart program in 2011. Securing the necessary funding to complete facility efficiency upgrades is often difficult for customers, and many are unclear where or how to start evaluating their facility's potential for energy conservation. Feasibility studies work to effectively demonstrate the potential energy and cost savings associated with improving energy efficiency within a facility. These studies are often the basis used by the customer to build a business case that will allocate the necessary corporate funding for project implementation. There were 68 feasibility studies completed in 2011, as shown in Table 7.5.

Туре	2011	2010	2009		
Feasibility Studies & DAP	68	67	121		
Audits	48	56	46		
Seminars	2	12	5		
Total	118	135	172		

Table	7.5 -	Facility	Audit	Partici	pation
I GOIC	/		/		pation

7.4 Program Costs

As noted in Table 7.6 below, direct budget expenditures in 2011 totalled approximately \$8.737 million, over \$3.681 million more than 2010 levels.

Distribution Contract Expenditures	I	Incentives	Program Costs		Total Costs		
2011	\$	8,014,800	\$	721,779	\$	8,736,579	
2010	\$	4,688,368	\$	366,878	\$	5,055,246	
2009	\$	4,231,669	\$	790,439	\$	5,022,108	

Table 7.6 - DC Program Expenditures

Table 7.6 shows that the majority of the budget in 2011 went to incentives, which was required to support the increased number of projects.

7.5 Lessons Learned

1. Monthly communications with customers help keep energy efficiency in the forefront

Union has been able to maintain high retention and interest in monthly energy efficiency topics since launching the GasWorks monthly newsletter with over 3700 visits in 2011. Also, the Enersmart website was updated to facilitate ease of use and customer access to the Enersmart program offerings, incentives, system improvement brochures and customer success stories.

2. Partnerships

Union has partnered with a series of entities in 2011 to offer feasibility studies and coaching opportunities to customers, including:

Universities/EnerSmart for Business with University of Windsor and McMaster University

Establishing a partnership with universities has numerous mutually beneficial outcomes, not only does it build energy management expertise for participating students, it also provides Union's commercial industrial clients with free energy audits. Union Gas initially partnered with the Department of Civil and Environmental Engineering at the University of Windsor. This unique business-academia partnership has received accolades and recognition from students, the academic world, and media across Canada. Due to the great success of the University of Windsor partnership, Union Gas initiated a new partnership with McMaster University.

Through the partnerships with both the Universities of Windsor and McMaster, Union's Energy Audit Program targets local schools as well as businesses with free energy audits to enable the reduction of energy use and greenhouse gas emissions. Union Gas provided \$500,000 in funding for the program and donated the specialized equipment needed to conduct the audits.

As with the University of Windsor partnership, McMaster is responsible for managing the program and reporting on program results. The Energy Audit Program is part of Union Gas' broader EnerSmart
program, which offers incentives to its larger commercial and industrial customers to implement projects that will use natural gas more efficiently and lower operating costs.

Additionally, Union Gas also provided equipment training, educational presentations as well as government training sessions to both universities to share industry specific knowledge and tools that address energy savings in industrial applications with students. Performing the energy audits is a practical lesson for the students, entrenching what they have learned and improving their overall engineering approach to conserve energy.

The partnership has significantly contributed to capacity building for Ontario, and real life experience for participating engineering students. It functions as a way to immerse each student involved into a post-graduation mindset.

3. Automating Project Processing, DSM Tracking and Reporting Upgrade

The enhanced quality control and electronic database and filing system allowed for project information to be input and instantly reviewed. 707 projects (this includes TRC and non-TRC generating projects) were put through the enhanced DSM Tracking system in 2011, 330 more than 2010, and 381 more than 2009. This reduced the administrative process burden despite the increase in project files.

8.0 Market Transformation

As determined through the OEB Decision with Reasons August 25, 2006, EB-2006-0021, \$1 million was allocated for Market Transformation in 2007, with a 10% escalating factor for each subsequent year of the three year plan, which was further extended annually for two consecutive years (2010 and 2011). Fourteen percent of Union's Market Transformation budget has been allocated to the Low-Income segment. Unlike Resource Acquisition programs, Market Transformation is not required to pass the TRC test; however, it is expected to meet clear criteria as outlined in the approved Market Transformation Scorecard for 2011 (Table 8.0 below). The utility is "entitled to an incentive payment of up to \$0.5 million in each year of the multi-year plan based on the measured success of market transformation programs."

Union's Market Transformation activities have been focused exclusively on the Drain Water Heat Recovery (DWHR) technology since 2007. Union's DWHR program has driven increased market penetration and supported the development of a competitive market for the technology in Ontario. However, based on best available information, Union has assessed the resource savings for a DWHR unit are materially lower than when the program was developed. For this reason, Union will exit this program in 2012.

8.1 Drain Water Heat Recovery Program Framework

In 2011, Union's DWHR Program engaged manufacturers of the technology in addition to builders, customers, and installers. The program continued to facilitate the sales process between manufacturers and home builders, work collectively to identify opportunities to reduce per unit costs, and foster a competitive marketplace for DWHR in Ontario.

To drive installation of DWHR units, incentives were offered to builders that participated in the program. Union also worked collaboratively with channel partners, such as HVAC contractors and the DWHR manufacturers to provide effective education and program participation incentives. In addition, the program provided technology specific training to residential builders and contractors to increase awareness of both the program and its benefits.

In 2011, Union continued to focus on direct marketing and one-to-one builder outreach. Through this direct marketing approach, Union was able to target builders on a personal level which resulted in increased uptake and participation within the builder community. Direct marketing approaches included:

- Co-branded marketing communication material with individual builders
- Working closely with builders to install units and signage in their model homes
- Outreach through partnerships with the Ontario Home Builder's Association (OHBA) and EnerQuality, as well as Manufacturers (RenewABILITY and EcoInnovations)
- Outreach at local builder events (i.e. golf tournaments, local home builder association events, etc)

Union also provided builder incentives of \$400 per participating home to encourage the purchase and installation of DWHR units. The incentive is provided to the DWHR manufacturer who passes it on to the builder as an on-bill rebate. This incentive structure was established in 2010 to encourage the development of relationships between market participants and thereby furthering the evolution toward a non-utility supported market for DWHR systems. The sell sheet, which was developed in 2010 to outline the process for builders, was improved upon in 2011 and included in the new 'Home Builder Portfolio'.

8.1.1 Program Improvements in 2011

Growing market share of a Second DHWR Manufacturer

In January 2010, Union made the strategic decision to encourage the development of a competitive marketplace by working closely with Quebec based manufacturer EcoInnovations. The goal was to have EcoInnovations move into the Ontario DWHR market. In order to facilitate their growth into the province, Union began working with their Ontario Manufacturer's Sales Representative, Air Solutions. EcoInnovations officially began to participate in Union's DWHR program in November 2010. With Union's support, they have grown their participation in the DWHR program throughout 2011. At the end of 2011, EcoInnovations/Air Solutions represented 20% of Union's total units, while RenewABILITY comprised 80%. This has created more choice and competitiveness within the DWHR market for builders.

Innovative Marketing Additions

Union created a push-pull strategy by encouraging both builders to install DWHR and homeowners to request DWHR from their builder. This strategy resulted in further enhancements to builder specific material in 2011, including co-branded sell sheets, builder brochures, and order forms. For the homeowner target audience, new customer brochures were created and for the first time this material was placed in the model homes' bathrooms.

Additional marketing material was improved upon in 2011, including lawn signs and model home signage.



Figure 8.2, 2011 DWHR Homeowner Brochure

8.1.2 Market Transformation Scorecard for 2011

Consistent with 2010, the 2011 MT scorecard tracked results against a two metrics to effectively measure program performance. Escalating on 2010 results, these metrics included:

- Number of participating builders as tracked by the program;
- Overall number of units installed as a percentage of residential new attachments (formerly referred to as "housing starts") as tracked by the program and available residential new attachments for Union's franchise;

Awareness of the product is quite high for builders, and growing for homeowners. In previous years, marketing approached larger builders first, followed by smaller builders. However, by the fifth year of the program, more targeted marketing activities were needed to obtain participation. As the target

audience for this program is fairly small (only those homeowners moving into new build homes each year are applicable), Union decided to focus on model home signage and targeted promotional activities in 2011.

8.2 **Program Results**

Table 8.0 outlines the results achieved in 2011 for the DWHR Market Transformation program.

Market Transformation DWHR Scorecard							
Matrice Weighting	Me	Metric Value Levels			Astual Desults	Dovout %	Score
	50%	100%	150%	weight	Actual Results	Payout %	Score
Participating Builders	122	128	133	20%	137	150	30/20
	15.72%	17.72%	19.72%				
Units Installed (new build) as a percentage of	or	or	or				
2011 residential new attachments *	2011 units	2267 units	2522 units	80%	2691	150	120/80
Overall Results					\$ 500,000.00	150%	150/100

*Formerly referred to as "Housing Starts"

Having surpassed 100% on the performance metrics, Union achieved a \$500,000 MT incentive payout for 2011. As outlined below, Union undertook several initiatives to promote DWHR to builders that resulted in 137 participating builders and a total of 2,691 installations. It is worth noting that market transformation programs are typically designed to influence consumer behaviour and attitudes through education. Based on DSM program delivery experience, Union has found that education, awareness, and outreach are critical components to program success, be they market transformation or resource acquisition.

Union Gas promoted DWHR throughout the year to builders and homeowners. Some examples of events are listed below:

- OHBA Industry Leaders Event Jan 18, 2011 (Toronto)
- Low Income DWHR Kick-off meeting, Jan 27, 2011 Air Solutions, City of Windsor, Plumbers
- OHBA Builder Forum; trade show and sponsorship, Feb 2-4, 2011
- OHBA Annual conference and Awards event, Sept 22, 2011
- London Lifestyles Home Show, Jan 28-30, 2011
- OBC 2012 Training (London, Hamilton, Sudbury, Kitchener, Chatham, Thunder Bay)

Union Gas supported home builders across the franchise and the program delivery group participated in activities to cultivate relationship building with builders as applicable. The largest growth areas include: Hamilton/Halton, London and Waterloo.



Figure 8.3, Hamilton Halton Home Builder's Association (HHHBA) From left to right: Frank Mercury (outgoing HHHBA President), Carla Agostino (incoming HHHBA President), Tracy Lynch (Manager Program Delivery, Union Gas)

Advertising for the program continued through the Ontario Home Builder magazine to create awareness and interest about DWHR. The magazine has a circulation of 3,500 builders in Ontario:

- Spring, Summer, Fall and Winter of 2011
- OHBA Awards 2011
- Annual Directory 2011

8.3 Program Costs

Union spent \$1.572 for its 2011 MT activity as shown in Table 8.1. Spend incremental to the \$1.464 million budget will be reflected in the DSMVA per EB-2006-021, Issue 6.1.

Market Transformation Expenditures	Incentives	Pro	ogram Costs	Total Costs
2011	\$1,385,764	\$	185,756	\$1,571,520
2010	\$1,023,174	\$	305,276	\$1,328,450
2009	\$ 825 <i>,</i> 330	\$	349,966	\$1,175,296

Table 0.1. 2011 Walket Hallstolliation Expenditure
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8.4 Lessons Learned

1. Importance of the development of a non-utility supported competitive marketplace

The addition of a second manufacturer, EcoInnovations and their Ontario Representative Air Solutions in November 2010 enhanced the DWHR program by highlighting the importance of the development of a non-utility supported competitive marketplace. This relationship has driven market share from 0% to 20% within Union's franchise area for these two organizations.

With the introduction of a competitive DWHR market in Ontario, the program has experienced a continued increase in productive competition, lower administrative costs, and the ability for Union to focus on additional innovative marketing and educational efforts.

2. Consumer Awareness and Acceptance

Union recognizes that it is equally important to promote new energy efficiency technologies to the end user, the consumer. These early adopters look for advanced technologies that will improve their homes efficiency as well as contribute to long term gas energy savings. The increased marketing efforts to the end user showcasing the products benefits, the economies of scale and the availability has been instrumental to the success of Union's DWHR program.

3. Transforming the Market

In 2007, Union selected DWHR for the purpose of MT specific to the residential new construction market. In the five years of promoting DWHR Union has been able to induce lasting structural and behavioural changes in the marketplace, resulting in increased adoption of DWHR. Union has been key in addressing awareness, availability, accessibility, affordability and acceptance of DWHR in the marketplace and for these reasons Union will exit this program in 2012.

9. Verification and Evaluation – 2011 Results

In order to ascertain the accuracy of claimed savings, Union undertakes several verification studies each year. These evaluation projects are designed to ensure that the claimed participation and installation rates for technologies delivered through Union's programs are accurate. An assessment of claimed savings obtained through custom projects was also completed. In addition, Union carries out related research to better understand the overall impacts and benefits that specific programs provide its customers. For 2011, Union commissioned verification studies for its Residential ESK, Low Income HHC, Commercial HWC, Commercial Custom and Distribution Custom programs as detailed in this section of the report.

9.1 Residential and Low Income Verification Studies

Union conducted five verification studies for the Residential Energy Saving Kit (ESK) program and one for the Low Income Helping Homes Conserve (HHC) program to ensure the savings claimed were accurate, as listed in Table 9.0. These verifications determined the number of ESK/HHC elements that were installed and remained installed for 2011. Additionally, since the savings associated with the ESK/HHC showerheads relate to showering for an entire home, the verification also established the portion of showering that was attributable to the ESK/HHC showerhead. The purpose of these studies was to provide an adjustment factor to be applied to the claimed savings. Union also uses the collected information to assess areas of program success and areas for potential improvement.

Program	Title	Source	Objective
ESKs:	Final Report Following	Beslin	- Validate consumers' awareness of
Union Direct	an Audit in 2011 of the	Communications	products received;
and HVAC	Union Gas ESK	Group Inc.	 Verify product installation;
Partnership	Residential "Push"		 Verify continuing usage of measures;
	Initiative (2011)		 Verify percentage showering;
			 Verify water heater type;
and	and		- Gauge customer satisfaction with
			equipment;
ESK	Final Report Following		- Determine influence of channel partners in
Replacements:	an Audit in 2011 of the		end-users' decisions to install products; and,
Union Direct	Union Gas ESK		- Gauge performance of channel partners in
and HVAC	Residential "Push"		delivery of products and ESK information.
Partnership	Replacement Initiative		
	(2011)		
ESKs:	Final Report Following	Beslin	- Validate accuracy of information tracking
Home Depot	an Audit in 2011 of the	Communications	sent by partners claiming incentives;
	Union Gas ESK Home	Group Inc.	 Verify measure installation;
	Depot "Pull" Initiative		 Verify continuing usage of measures;
	(2011)		 Verify percentage showering;
			 Verify water heater type;
and	and		 Understand end-users' knowledge of
			energy efficiency, purchase motivations, and
ESK	Final Report Following		general satisfaction;
Replacements:	an Audit in 2011 of the		- Determine factors affecting end-users'
Home Depot	Union Gas ESK Home		decisions to install; and,

Table 9.0 - Summary of Program Verifications for Residential Programs

	Depot "Pull" Replacement Initiative (2011)		- Opinions on other incentives Union Gas could offer
ESKs: Install	Final Report Following an Audit in 2011 of the Union Gas ESK "Install" Initiative (2011)	Beslin Communications Group Inc.	 Validate the accuracy of information; recorded by Channel Partners; Verify measure installation; Verify continuing usage of measures; Verify percentage showering; Verify water heater type; Gauge customer satisfaction with equipment; Gauge end-user understanding of the efficiency level of measures installed
HHC: Low Income	Final Report Following an Audit in 2011 of the Union Gas HHC Low Income Initiative (2011)	Beslin Communications Group Inc.	 Validate consumers' awareness of products received; Verify measure installation; Verify continuing usage of measure; Verify percentage showering; Verify water heater type; Gauge customer satisfaction with equipment; Determine influence of channel partners in end-users' decisions to install products; and, Gauge performance of channel partners in delivery of products and ESK information.

The results of these evaluations are summarized in section 9.1.1 below.

9.1.1 ESK and HHC Program Verification Results

In order to fully assess the savings generated through the ESK and HHC program offerings, Union completed a verification study to determine the rate at which measures were installed and remained installed with participants. During the 2010 audit, a recommendation was made to ensure the verification study presented results to reflect the percentage of homes that heat their water with natural gas. This value had been captured in the verification study previously; however, it had not been presented in the tabulated results, but rather in text in the body of the report. The final verified results for the ESK & HHC programs include this recommendation and are presented in Tables 9.1, 9.2, 9.3, and 9.4 below and are reflective of gross savings, not participant count. As demonstrated in Tables 9.3 and 9.4, providing customer installation of measures clearly result in more favourable adjustments.

Table 9.1 - Adjustment Factors: ESK Union Gas Direct and HVAC (Push)

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under Iow-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	46.99%	74.36%		82.53%	28.84%
Kitchen Aerator	59.64%	86.87%		82.53%	42.76%
Pipe Wrap	64.46%	94.39%		82.53%	50.21%
Showerhead	65.06%	85.19%	86.68%	82.53%	39.65%
Showerhead - Replacement	88.24%	97.33%	81.85%	100.00%	70.29%

Table 9.2 - Adjustment Factors: ESK Home Depot (Pull)

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under low-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	52.94%	91.11%		89.41%	43.13%
Kitchen Aerator	65.88%	94.64%		89.41%	55.75%
Pipe Wrap	70.00%	95.80%		89.41%	59.96%
Showerhead	71.76%	86.89%	80.19%	89.41%	44.71%
Showerhead - Replacement	76.25%	93.44%	79.39%	100.00%	56.56%

Table 9.3 - Adjustment Factors: ESK Install

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under low-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	79.00%	100.00%		100.00%	79.00%
Kitchen Aerator	71.00%	94.37%		100.00%	67.00%
Pipe Wrap	83.00%	100.00%		100.00%	83.00%
Showerheard	97.00%	98.97%	76.30%	100.00%	73.25%

Table 9.4 - Adjustment Factors: HHC Low Income

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under low-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	84.85%	100.00%		96.36%	81.76%
Kitchen Aerator	84.85%	95.71%		96.36%	78.26%
Pipe Wrap	93.94%	100.00%		96.36%	90.52%
Showerheard	95.15%	99.36%	86.22%	96.36%	78.55%

Through the audit process, the auditor made four adjustment factor recommendations relating to various ESK Residential Push/Pull/Install measures.

The first item addressed Union's approach to handling "don't know" responses for the percentage of participants that have natural gas fuelled domestic hot water heaters. Union applied current market research industry practices to deal with the "don't know" responses, which entails removing the responses from the overall population and then recalculating the new results. The Auditor, while agreeing that this approach was in line with current industry practice, recommended that Union take a more conservative approach to count all "don't know" responses as "no" responses. Similar to the treatment of "don't know" responses for the domestic hot water heaters, the Auditor recommended that all "don't know" responses to the question on what percentage of showering is done under the

low-flow showerhead should be counted as zero instead of removing them from the population. The two remaining audit adjustments relate to corrections of clerical errors that were discovered in the replacement calculation adjustment factors. Tables 9.1 to 9.4 have been updated to reflect the Auditor's recommendations noted above.

9.2 Commercial Prescriptive Program Verification Studies

Union conducted verification studies for the multi-family and non multi-family commercial Hot Water Conservation (HWC) Programs to ensure the savings claimed were accurate. Union contracted the SeeLine Group Ltd. to perform the verification study for the multi-family program stream and Energuy Canada Ltd. for the non multi-family program stream. The non multi-family program includes the following segments: Hotel/Motel, Long Term Care/Retirement Facilities, University Residences/Dorms, and "Other" (such as food services, entertainment, etc).

9.2.1 Commercial Prescriptive Program Verification Results

These verification studies determined the number of HWC elements that were installed through onsite inspections. The purpose of these studies was to provide an adjustment factor to be applied to the claimed savings. Union also uses the collected information to assess areas of program success and areas for potential improvement. The final verified results for the multi-family and non multifamily segments are presented in Tables 9.5 and 9.6 below.

Table 9.5 - Adjustment Factors: HWC Multi-Family

Measure	Adjustment Factor
Showerhead	53.06%
Bathroom Aerator	38.67%
Kitchen Aerator	60.61%

During the audit process, a data transfer error was found from the verification study report to the Audit Tool for both the bathroom and kitchen aerator measures. Accordingly, the above adjustment factors have been updated from the Draft Annual Report and reflect the findings in the final verification study.

Table 9.6 - Adjustment Factors: HWC Non Multi-Family

Measure	Adjustment Factor
Showerhead	90.21%
Bathroom Aerator	52.33%
Kitchen Aerator	73.81%

The adjustment factors applied to the non multi-family sector were verified at an aggregate level to reflect the sampling methodology. Detailed findings for segment specific results in the non multi-family sector are presented in table 9.7 below.

The audit uncovered a clerical data transfer error from the verification study to the Audit Tool for the kitchen aerator measure. The above adjustment factor has been updated from the Draft Annual Report and reflects the findings of the final verification study.

		University		
		Residences and	Long Term Care and	Other -
	Hotel/Motel -	Dormitories -	Retirement Facilities -	Measure
	Measure Verified	Measure Verified	Measure Verified	Verified
Measure	Installed	Installed	Installed	Installed
Showerhead	97.80%	94.70%	85.00%	75.80%
Bathroom Aerator	31.10%	45.00%	100.00%	51.40%
Kitchen Aerator	NA	74.50%	N/A	72.70%

Table 9.7 - Verification Results: HWC non Multi-Family Segments

9.3 Commercial/Industrial and Distribution Contract Custom Project Verification

Each year Union conducts a verification study for both the Commercial/Industrial Custom program and the Distribution Contract Custom program. In completing this work, Union looks to validate that the claimed savings reported through the custom projects are accurate and recommend any adjustment factors to the savings if required.

Summit Blue Canada provided a revised sampling methodology for the annual engineering review of custom DSM projects in 2008. This sampling methodology far exceeded the OEB's TRC Guide requirements for sampling for custom projects:

- Develop an approach that considers the significance of water and electricity savings;
- Adjust strata sizes to meet practical challenges in field applications, specifically census samples for the largest projects; and,
- Accommodate two sample assessment periods per year.

9.3.1 Commercial/Industrial Custom Project Verification Study

Navigant was contracted to extract a statistically representative sample for the purpose of Commercial Custom Project verification using the methodology established in 2008. To this end, the program projects were stratified by resource benefits as summarized in Table 9.8 below.

Description Commercial/Industrial (COM)	n (Stratum)	NATURAL GAS (m3)	WATER (1000's L)	ELECTRICITY (kWh)	NATURAL GAS TRC (Unadjusted Benefits)	WATER TRC (Unadjusted Benefits)	ELECTRICITY TRC (Unadjusted Benefits)	TRC (Unadjusted Benefits)
Sample Gas - High	10	2,344,322	-	361,573	\$6,700,055	\$0	\$355,148	\$7,035,203
Sample Gas - Medium	9	1,018,928	9,155	778,605	\$2,741,241	\$175,313	\$668,506	\$3,585,059
Sample Gas - Low	6	234,811	85,977	206,746	\$544,838	\$1,668,816	\$178,042	\$2,391,696
Total Projects Sampled	25	3,598,061	95,132	1,346,924	\$9,986,134	\$1,844,129	\$1,201,696	\$13,011,958
Commercial Custom Total Project Population	163	7,984,421	135,761	5,435,292	\$21,267,679	\$2,478,496	\$3,511,532	\$27,257,706
% of population sampled		45.1%	70.1%	24.8%	47.0%	74.4%	34.2%	47.7%

Table 9.8 - Sample of Commercial/Industrial Custom Projects for Verification

*Pre-audited savings claims

Navigant pulled a sample of 25 projects for the 2011 Commercial Custom Projects program, all of which were verified by Michaels Energy. Of these projects, 5 were verified on-site following Union's 2010 Audit recommendation. While Union has conducted on-site verification for unusually large Commercial Custom Projects in the past, 2011 was the first year that projects were selected from the sample to be verified on-site.

The sample projects represent 47.7% of the total unadjusted TRC savings of all Commercial Custom projects based on the original claimed savings. Given the geographic distribution of Commercial Custom Projects compared to benefits that the projects achieve, verification for this program primary includes a paper review of the projects files coupled with telephone interviews with customers and service providers for the verification of savings results for 20 of the sampled commercial projects. A subset of five projects was selected for on-site verification based on their complexity, and savings magnitude.

The deliverables of the verification studies included:

- A description of approach used to measure savings (including gas, water, and electricity savings, incremental cost and measure life, as appropriate);
- The results of telephone interviews to confirm installation and operating conditions;
- A detailed review of the methodology used by the evaluator to project the savings that would result from project implementation;
- A discussion of reasons (if applicable) for any variance between the projected and the evaluated savings;
- The evaluator's recommended adjustment factors based on the variance between the projected and evaluated savings claims; and,
- A report on calculation methodologies employed and recommendations for refinements for future savings calculations.

Commercial/Industrial Custom Project Verification Results

Adjustment factors determined through the Commercial Custom Project Verification Study are presented in Table 9.9 below. These adjustments have been applied to the Commercial Custom program savings claims for the purpose of this report.

Commercial Custom Program Verification Results											
Resource Claimed Savings Verification Savings Realization Rate											
Natural Gas Savings		3,598,061		2,392,292	66.5% m3/year						
Water Savings		95,131,545		82,042,370	86.2% litres/year						
Electricity Savings		1,346,925		1,099,857	81.7% kWh/year						
Incremental Cost	\$	2,583,411	\$	2,366,332	91.6%						
EUL		18.08		17.27	95.5%						

Table 9.9 - 2011 Commercial Custom Program Verification Study Results

Through the Audit process, new adjustment factors were recommended and applied for six of the Commercial Custom projects. The Final Audited realization rates presented in Table 9.10 below have been applied to the 2011 Commercial Custom Program portfolio as recommended by the Auditor.

Table 9.10 – 2011 Commercial Custom Project Audit Adjustments

Resource	2011 Draft Annual Report	2011 Audit Value
Natural Gas Savings	66.5%	65.9%
Water Savings	86.2%	86.3%
Electricity Savings	81.7%	79.7%
Incremental Cost	91.6%	91.6%
EUL	95.5%	95.5%

9.3.2 Distribution Contact Custom Project Verification Study

As described in Section 9.3 above, a sample of 13 custom projects from the Distribution Contact sector was selected for the verification study by Navigant.

The sample for the industrial sector is stratified based on size of projects for gas, water, and electricity savings. Projects were randomly selected from among the largest projects based on TRC benefits from gas savings and the largest based on electricity savings. Table 9.10 summarizes the Distribution Contract sample.

Description Distribution Contract (IND)	n (Stratum)	NATURAL GAS (m3)	WATER (1000's L)	ELECTRICITY (kWh)	NATURAL GAS TRC (Unadjusted Benefits)	WATER TRC (Unadjusted Benefits)	ELECTRICITY TRC (Unadjusted Benefits)	TRC (Unadjusted Benefits)
Sample Gas - High	4	22,745,788	156,470	28,359,484	\$64,898,754	\$3,044,835	\$26,286,801	\$94,230,390
Sample Gas - Medium	5	9,596,224	36,412	586,998	\$21,464,843	\$614,560	\$484,858	\$22,564,261
Sample Gas - Low	4	2,095,677	64,259	869,136	\$4,709,398	\$1,152,765	\$775,483	\$6,637,647
Total Projects Sampled	13	34,437,689	257,142	29,815,618	\$91,072,995	\$4,812,160	\$27,547,142	\$123,432,298
Distribution Contract Custom Total Project Population	496	281,115,783	1,250,612	56,938,448	\$601,163,100	\$19,741,409	\$48,997,467	\$669,901,976
% of population sampled		12.3%	20.6%	52.4%	15.1%	24.4%	56.2%	18.4%

*Pre-audited savings claims

The 13 sampled projects represent 18.4% of the total unadjusted TRC savings of all Distribution Contract custom projects based on the original Distribution Contract claimed savings.

On-site verification studies were conducted by Diamond Engineering. In completing this work, the focus was to validate whether or not the claimed savings reported through the custom projects were accurate and recommend any adjustment factors to the savings if required. The objectives of the on-site verification studies included:

- Determination of whether savings calculations in the application were reasonable based on information available at the time made;
- Review of the assumptions used in calculations;
- Discussion of variations between project and savings ;
- Recommend adjustment factors based on the variance between the projected and evaluated savings;
- Verify that the equipment installation was completed at the site; and,
- Review of the confidence interval levels achieved in the results and statement of errors for calculations.

Distribution Contact Custom Project Verification Results

The results of the Distribution Contract custom project verification are presented in Table 9.11 below.

	DC Custom Program Verification Results											
Resource	Realization Rate											
Natural Gas Savings		33,807,360		37,059,854	109.62% m3/year							
Water Savings		255,119,480		274,563,463	107.62% litres/year							
Electricity Savings		29,815,618		32,127,316	107.75% kWh/year							
Incremental Cost	\$	8,134,367	\$	8,134,367	100.00%							
EUL		18.09		18.94	104.70%							

Table 9.12 - 2011 Distribution Contract Custom Project Verification Study Results

The results presented in Table 9.11 do not include one project (2011-IND-0335), which has been treated as an outlier. Based on previous related audit experience, the realisation rates for this project were not applied to the portfolio due to the large variance from the mean. For perspective, including the outlier in the realization rates would increased Union's TRC claim by \$67,724,554.

10. 2011 Measures Evaluation Research

During the course of the three-year DSM framework, Union's measure evaluation strategy has been to undertake evaluations of a third of each program measure included in the 2007-2009 DSM Plan annually in accordance to EB-2006-0021. 2009 presented an unusual challenge because many of the evaluation projects that might have been undertaken in 2009 were precluded by the OEB commissioning and approving of Navigant Consulting Inc.'s, *Measures and Assumptions for Demand Side Management (DSM) Planning*, dated April 16, 2009. In 2011, as Union entered the fifth year under the framework what was intended to be a three year framework, this challenge remained unchanged. In addition, with focus on discussions on new measures and activities surrounding the 2012-2014 DSM Plan, no evaluation priorities were established in 2011.

11. Lost Revenue Adjustment Mechanism (LRAM)

The LRAM was approved by the Ontario Energy Board to allow Union to recover the lost distribution revenues associated with DSM activity. These lost revenues are calculated for each rate class impacted by DSM energy efficiency programs using the following formula:

Σ(Rate Class Volume Reduction x 2011 Delivery Rate) = LRAM Claimed

For 2011, the year one LRAM amount is \$0.821 million based on 2011 delivery rates and natural gas savings of 163.703 million m³. The 2011 LRAM statement is detailed in Table 11.0 below.

	Ц	ost Revenue Adjustm 2011 Unaudited	ent Me Result	chanism Is			
ine No	Darticulare	Audited Volumes	201	1 Delivery	Revenue Impac		
Jine No.	Faiticulars	$(10^{3} m^{3})$	Rate	$s (\$/10^3 m^3)$		(\$)	
		(a)		(b)	(a)	x (b) x 50	
	South						
1	M1 Residential	5,387	\$	40.757	\$	109,783	
2	M1 Commercial	4,447	\$	40.757	\$	90,620	
3	M1 Industrial	1,246	\$	40.757	\$	25,385	
4	M2 Commercial	6,064	\$	40.763	\$	123,586	
5	M2 Industrial	3,129	\$	40.763	\$	63,771	
б	M4 Industrial	7,981	\$	8.764	\$	34,973	
7	M5 Industrial	14,414	\$	14.574	\$	105,037	
8	M7 Industrial	12,780	\$	2.418	\$	15,450	
9	Tl Industrial	86,670	\$ 0.913		\$	39,565	
10		142,117			\$	608,170	
	North						
11	01 Residential	1,653	\$	91.828	\$	75,892	
12	01 Commercial	1,256	\$	85.583	\$	53,733	
13	10 Commercial	1,549	\$	62.162	\$	48,153	
14	10 Industrial	484	\$	57.001	\$	13,788	
15	20 Industrial	4,577	\$	3.683	\$	8,429	
16	100 Industrial	12,067	\$	2.065	\$	12,459	
17		21,586			\$	212,455	
18	Total	163 703			¢	820 625	

Table 11.0 - 2011 LRAM Statement

The 2011 LRAM statement has been prepared using the 2011 input assumptions approved by the OEB. These assumptions are detailed in Appendix A. LRAM results by measure are shown in Appendix C. In EB-2006-0021 Decision with Reasons the Board ruled that the year one impact of DSM activities is equivalent to 50% of the savings in the first year in which the DSM measure is undertaken.

12. Shared Savings Mechanism (SSM)

For 2011, Union is eligible to earn an SSM incentive based on DSM program results. The SSM incentive payment has been calculated using the methodology approved by the OEB in the DSM Generic Hearings. The SSM incentive is calculated using the following structure:

- For TRC savings between 0 percent and 25 percent of the TRC target, an SSM payout shall equal \$900 for each 1/10 of 1 percent of target reached;
- For TRC savings between 25 percent and 50 percent of the TRC target, an SSM payout shall equal \$225,000 plus \$1,800 for each 1/10 of 1 percent of target reached;
- For TRC savings between 50 percent and 75 percent of the TRC target, an SSM payout shall equal \$675,000 plus \$6,300 for each 1/10 of 1 percent of target reached; and,
- For TRC savings greater than 75 percent of the TRC target, an SSM payout shall equal \$2,250,000 plus \$10,000 for each 1/10 of 1 percent of target reached up to the maximum SSM annual cap of \$8,500,000.

For 2011, the 2010 SSM incentive cap of \$8,939,426 million will increase annually by the Ontario CPI as determined in October of the preceding year. For 2011, the annual SSM incentive cap increased to **\$9,243,367**. This was reflective of the 3.4% annual increase of the Ontario CPI as determined in October 2011. Union's net TRC calculation for 2011 is shown in Table 12.0.

New Home Construction	\$ 33,066		
Home Retrofit	\$ 16,029,545		
Residential Program Costs	\$ (957,530)		
Net Residential TRC		\$ 15,105,081	
Low Income	\$ 15,339,864		
Low Income Program Costs	\$ (271,410)		
Net Low Income TRC		\$ 15,068,454	
New Building Construction	\$ 7,972,800		
Building Retrofit	\$ 25,133,183		
Commercial Program Costs	\$ (519,801)		
Net Commercial TRC		\$ 32,586,182	
Distribution Contract	\$ 324,376,629		
Distribution Contract Program Costs	\$ (721,779)		
Net Distribution Contract TRC		\$ 323,654,850	
Salaries	\$ (5,716,463)		
Research & Evaluation	\$ (1,269,738)		
Administration	\$ (48,946)		
Total Other Program Costs		\$ (7,035,147)	
Net TRC			\$ 379,379,419

Table 12.0 - 2011 Net TRC Calculation

Union's TRC target for 2011 is \$252,652,675 million, which results in the following SSM calculation:

SSM = {[(Net TRC – (Range End Percentage x Target TRC)) / (Payout Increment Percentage x Target TRC)] x Incremental Payout} + Base Payout

= {[(Net TRC - (75% x \$252,652,675)) / (0.1 % x \$252,652,675)] x \$10,000} + \$2,250,000

- $= \{ [(\$379, 379, 419 \$189, 489, 506) / \$252, 653] \times \$10,000 \} + \$2, 250,000 \}$
- = \$751.58 x \$10,000 + \$2,250,000

= \$9,765,848⁸

The TRC breakdown by measure is included in Appendix D. The SSM breakdown by rate class is shown in Table 12.1 below.

⁸ SSM Incentive without Cap. 2011 SSM Cap is \$ 9,243,367

Table 12.1 – 2011 SSM by Rate

	Sha: 20	red Savings Me 011 Audited Re	chan: sults	lsm S					
Line No.	Line No. Particulars Amount ⁽¹⁾ (\$)								
	Sout	h							
1	Ml	Residential	\$	566,187					
2	Ml	Commercial	\$	244,222					
3	Ml	Industrial	\$	73,472					
4	M2	Commercial	\$	290,677					
5	M2	Industrial	\$	207,076					
6	M4	Industrial	\$	512,983					
7	M5	Industrial	\$	980,927					
8	М7	Industrial	\$	610,676					
9	Т1	Industrial	\$	4,404,012					
10			\$	7,890,233					
	Nort	h							
11	01	Residential	\$	180,215					
12	01	Commercial	\$	71,589					
13	10	Commercial	\$	79,260					
14	10	Industrial	\$	24,972					
15	20	Industrial	\$	291,511					
16	10	0 Industrial	\$	705,587					
17			\$	1,353,134					
18	Tota	.1	\$	9,243,367					
(1)	The a	allocation is ba	sed o	n 2011 TRC					

13. DSM in 2011

The primary purpose of this Annual Report is to review program outcomes from the preceding year. In previous annual reports the secondary purpose was to also establish targets for the upcoming year, this is no longer the case as in 2012 Union enters a new DSM framework in which targets have already been established (EB-2011-0327).

13.1 2011 Avoided Costs

The Avoided Costs for 2011 are attached in Appendix E.

Appendix A: Input Assumptions (SSM) and (LRAM)

				SSM Input Assumptions									LRAM Input Assumptions		
		Measure	Equipment		Free Rider	Adjustment	Natural Gas	Water	Electricity	Incremental	Free	Adjustmen	t Natural Gas		
			Life	Energy Load	Rate	Factor	Savings (m2)	Savings (L)	Savings	Cost	Rider	Factor	Savings (m3)		
-	Faucet Ae	erator - Bath - 1.5gpm	10	baseload	33.0%	100.0%	6	2.004	-	\$0.49	33.0%	100.0%	6		
NH	C Faucet Ae	erator - Kitchen - 1.5gpm	10	baseload	33.0%	100.0%	19	6,201	-	\$1.29	33.0%	100.0%	19		
	Showerhe	ead - 1.25gpm	10	baseload	10.0%	100.0%	44	13,885		\$3.79	10.0%	100.0%	44		
		Install - Faucet Aerator - Bath - 1.5gpm	10	Baseload	33.0%	79.0%	6	2,004	-	\$0.49	33.0%	79.0%	6		
		Install - Faucet Aerator - Kitchen - 1.5gpm	10	Baseload	33.0%	67.0%	23	7,797	-	\$1.29	33.0%	67.0%	23		
	ESK	Install - Showerhead - 1.25gpm	10	Baseload	4.0%	73.3%	44	13.885		\$3.79	10.0%	73.3%	44		
		Install - Showerhead - 1.25gpm exist 2.6+	10	Baseload	10.0%	73.3%	88	22,580		\$3.79	10.0%	73.3%	88		
		Install - Showerhead - 1.25gpm - Replacement	10	Baseload	10.0%	56.6%	33	11,584		\$3.79	10.0%	56.6%	33		
		Pull - Faucet Aerator - Bath - 1.5gpm	10	Baseload	33.0%	43.1%	6	2,004	-	\$0.49	33.0%	43.1%	6		
	ECK.	Pull - Faucet Aerator - Kitchen - 1.5gpm	10	Baseload	33.0%	55.8%	23	7,797	-	\$1.29	33.0%	55.8%	23		
HF	C ESK	Pull - Pipe Insulation - 2m Pull - Showerbead - 1 25mm	10	Baseload	4.0%	60.0%	18	12 995		\$0.98	4.0%	60.0%	18		
		Pull - Showerhead - 1.25gpm - Replacement	10	Baseload	10.0%	56.6%	33	11.584		\$3.79	10.0%	56.6%	33		
		Push - Faucet Aerator - Bath - 1.5gpm	10	Baseload	33.0%	28.8%	6	2,004		\$0.49	33.0%	28.8%	6		
		Push - Faucet Aerator - Kitchen - 1.5gpm	10	Baseload	33.0%	42.8%	23	7,797	-	\$1.29	33.0%	42.8%	23		
	ESK	Push - Pipe Insulation - 2m	10	Baseload	4.0%	50.2%	18	-	-	\$0.98	4.0%	50.2%	18		
		Push - Showerhead - 1.25gpm	10	Baseload	10.0%	39.6%	44	13,885	-	\$3.79	10.0%	39.6%	44		
	Thermost	rush - Showerhead - 1.25gpm - Replacement	10	weather	10.0%	100.0%	53	11,584	- 54	\$3.79	10.0%	100.0%	53		
-	mennost	HHC - Faucet Aerator - Bath - 1.0gpm	10	baseload	1.0%	81.8%	10	3.435		\$0.55	1.0%	81.8%	10		
		HHC - Faucet Aerator - Kitchen - 1.5gpm	10	baseload	1.0%	78.3%	23	7,797		\$1.39	1.0%	78.3%	23		
	ESK	HHC - Pipe Insulation - 2m	10	baseload	1.0%	90.5%	18	-	-	\$2.00	1.0%	90.5%	18		
		HHC - Showerhead - 1.25gpm exist 2.0-2.5	10	baseload	1.0%	78.6%	46	14,294	-	\$3.69	1.0%	78.6%	46		
		HHC - Showerhead - 1.25gpm exist 2.6+	10	baseload	1.0%	78.6%	88	22,580	-	\$3.69	1.0%	78.6%	88		
_	Thermost	at - Programmable - HHC	15	weather	1.0%	100.0%	53	-	54	\$26.95	1.0%	100.0%	53		
	CEE Tier 2	Front-Loading Clothes Washer (MF)	11	baseload	10.0%	100.0%	117 Ouaci	58,121 Ounci	396 Ouaci	\$600 Quasi	10.0%	100.0%	117 Ouaci		
	Condensi	ng Boiler - up to 255 MBtu/h	25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	Condensi	ng Boiler - over 1,000 Mbtu/h	25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	Condensi	ng Gas Water Heater (1,000gal/day)	13	baseload	5.0%	100.0%	1,551	-	-	\$2,230	5.0%	100.0%	1,551		
	Custom A	griculture	Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual		
	Custom N	lew Construction	Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual		
	DCKV Fast	t Casual (< 5000 cfm)	15	weather	5.0%	100.0%	4,801	-	13,521	\$10,000	5.0%	100.0%	4,801		
	Dichwach	wenu (5000 - 5959 cim) er - Rack Conveyor - Single High Temperature	20	Received	5.0% 27.0%	100.0%	2 202	210 271	30,901	\$15,000	27.0%	100.0%	2 202		
	Dishwash	Dishwasher - Stationary Rack - High Temperature		Baseload	20.0%	100.0%	619	87.119	3,553	-\$350.00	20.0%	100.0%	619		
	Dishwash	Dishwasher - Stationary Rack - Low Temperature		Baseload	20.0%	100.0%	841	118,369	855	-\$350.00	20.0%	100.0%	841		
	Dishwasher - Undercounter - High Temperature		10	Baseload	40.0%	100.0%	801	112,795	3,754	-\$13.00	40.0%	100.0%	801		
NB	Energy Star Front Load Clothes Washer		11	Baseload	48.0%	100.0%	76	19,814	201	\$150.00	48.0%	100.0%	76		
	Energy St	Energy Star Fryer		Baseload	20.0%	100.0%	1,083	-	17	\$1,028.00	20.0%	100.0%	1,083		
	Energy St	ar Steam Cooker	10	Baseload	20.0%	100.0%	3,224	42,812	162	\$2,000.00	20.0%	100.0%	3,224		
	ERV - up t	r 1000CFM - Multi Family, Health Care, Nursing	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	ERV - up t	o 2000CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	ERV - ove	r 2000CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	ERV - up t	to 2000CFM - Office, Warehouse, School	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	ERV - ove	r 2000CFM - Office, Warehouse, School	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	HRV - Hea	alth Care, Multi Family	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	HRV - 500	10 1999CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	Infrared F	leating - 20 to 99 MBtu/hr	20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	33.0%	100.0%	Quasi		
	Infrared H	leating - 100 to 300 MBtu/hr	20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	33.0%	100.0%	Quasi		
	MUA - Im	proved Efficiency 1700 to 2999CFM - Multi Family , Long Term Care	15	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	CEE Tier 2	Front-Loading Clothes Washer (MF)	11	baseload	10.0%	100.0%	117	58,121	396	\$600	10.0%	100.0%	117		
1	CEE Tier 2	Front-Loading Clothes Washer (Laundromat)	11	baseload	10.0%	100.0%	117	58,121	396	\$601	10.0%	100.0%	117		
	Condensi	ng Boiler - up to 299 MBtu/h	25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	Condensi	ng Boiler - over 1 000 Mbtu/h	25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
	Condensi	ng Gas Water Heater (1,000gal/day)	13	baseload	5.0%	100.0%	1,551	-	-	\$2,230	5.0%	100.0%	1,551		
	Custom A	griculture	Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual		
	Custom R	etrofit	Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual		
	DCKV Fas	t Casual (< 5000 cfm)	15	weather	5.0%	100.0%	4,801	-	13,521	\$10,000	5.0%	100.0%	4,801		
	DCKV Full	Menu (5000 - 9999 cfm)	15	weather	5.0%	100.0%	11,486	-	30,901	\$15,000	5.0%	100.0%	11,486		
	Disbwash	Cation Fan er - Pack Conveyor - Single High Temperature	15	Received	27.0%	100.0%	2 202	Quasi 210 271	Quasi 0.911	Quasi \$2,275,00	27.0%	100.0%	Quasi		
	Dishwash	er - Stationary Rack - High Temperature	15	Baseload	20.0%	100.0%	619	87.119	3,553	-\$350.00	20.0%	100.0%	619		
	Dishwash	er - Stationary Rack - Low Temperature	15	Baseload	20.0%	100.0%	841	118,369	855	-\$350.00	20.0%	100.0%	841		
BF	Dishwash	er - Undercounter - High Temperature	10	Baseload	40.0%	100.0%	801	112,795	3,754	-\$13.00	40.0%	100.0%	801		
1	Energy St	ar Convection Oven	12	Baseload	20.0%	100.0%	847	-	1	\$875.00	20.0%	100.0%	847		
1	Energy St	ar Front Load Clothes Washer	11	Baseload	48.0%	100.0%	76	19,814	201	\$150.00	48.0%	100.0%	76		
1	Energy St	ar Fryer ar Steam Cooker	12	Baseload	20.0%	100.0%	1,083	42 012	17	\$1,028.00	20.0%	100.0%	1083		
1	Energy St	a steam cooker	10	baseload weather	20.0%	100.0%	3,224 Quasi	42,812 Quasi	162	\$2,000.00 Quasi	20.0%	100.0%	5224 Quasi		
1	ERV - ove	r 1000CFM - Multi Family, Health Care, Nursing	14	weather	5,0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
1	ERV - up t	to 2000CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
1	ERV - ove	r 2000CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
1	ERV - up t	o 2000CFM - Office, Warehouse, School	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
1	ERV - ove	r 2000CFM - Office, Warehouse, School	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		
1	High Effic	iency Under-Fired Broller	12	Baseload	20.0%	100.0%	1,677	-	-	\$1,270.00	20.0%	100.0%	1677		
1	HRV - 100	to 1999CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi		

HRV -	over 1999CFM - Hotel, Restaurant, Retail	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
HRV -	over 1999CFM - Office, Warehouse, School	14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
HWC -	Bathroom Aerator - University College Dorms - 1.0 gpm	10	Baseload	10.0%	52.3%	8	1,719	-	\$0.59	10.0%	52.3%	8
HWC -	Bathroom Aerator - University College Dorms - 1.0 gpm - Rebate	10	Baseload	10.0%	52.3%	8	1,719	-	\$3.59	10.0%	52.3%	8
HWC -	Bathroom Aerator - Hotel Motel - 1.0 gpm	10	Baseload	10.0%	52.3%	6	2,221	-	\$0.59	10.0%	52.3%	6
HWC -	Bathroom Aerator - Hotel Motel - 1.0 gpm - Rebate	10	Baseload	10.0%	52.3%	6	2,221	-	\$3.59	10.0%	52.3%	6
HWC -	Bathroom Aerator - Long Term Care and Retirement - 1.0 gpm	10	Baseload	10.0%	52.3%	10	2,254	-	\$0.59	10.0%	52.3%	10
HWC -	Bathroom Aerator - Long Term Care and Retirement - 1.0 gpm - Rebate	10	Baseload	10.0%	52.3%	10	2,254	-	\$3.59	10.0%	52.3%	10
HWC -	Bathroom Aerator - Other Commercial Institutional - 1.0 gpm	10	Baseload	10.0%	52.3%	8	2,065	-	\$0.59	10.0%	52.3%	8
HWC -	Bathroom Aerator - Other Commercial Institutional - 1.0 gpm - Rebate	10	Baseload	10.0%	52.3%	8	2,065	-	\$3.59	10.0%	52.3%	8
HWC -	Bathroom Aerator - Multi Family - 1.0 gpm	10	Baseload	10.0%	38.7%	7	2,371	-	\$0.59	10.0%	38.7%	7
HWC -	Bathroom Aerator - Multi Family - 1.0 gpm - Rebate	10	Baseload	10.0%	38.7%	7	2,371	-	\$3.59	10.0%	38.7%	7
HWC-	Kitchen Aerator - University College Dorms - 1.5 gpm	10	Baseload	10.0%	73.8%	16	5,377	-	\$1.29	10.0%	73.8%	16
HWC -	Kitchen Aerator - University College Dorms - 1.5 gpm - Rebate	10	Baseload	10.0%	73.8%	16	5,377	-	\$4.29	10.0%	73.8%	16
HWC -	Kitchen Aerator - Other Commercial Institutional - 1.5 gpm	10	Baseload	10.0%	73.8%	16	5,377	-	\$1.29	10.0%	73.8%	16
HWC-	Kitchen Aerator - Other Commercial Institutional - 1.5 gpm - Rebate	10	Baseload	10.0%	73.8%	16	5,377	-	\$4.29	10.0%	73.8%	16
HWC-	Kitchen Aerator - Multi Family - 1.5 gpm	10	Baseload	10.0%	60.6%	16	5,377	-	\$1.29	10.0%	60.6%	16
HWC-	Kitchen Aerator - Multi Family - 1.5 gpm - Rebate	10	Baseload	10.0%	60.6%	16	5,377	-	\$4.29	10.0%	60.6%	16
HWC -	Showerhead - University College Dorms - 1.25 gpm	10	Baseload	10.0%	90.2%	32	8.326		\$3.79	10.0%	90.2%	32
HWC-	Showerhead - University College Dorms - 1.25 gpm - Rebate	10	Baseload	10.0%	90.2%	32	8.326		\$6.79	10.0%	90.2%	32
HWC-	Showerhead - Hotel Motel - 1.25 gpm	10	Baseload	10.0%	90.2%	18	5,250		\$3.79	10.0%	90.2%	18
HWC-	Showerhead - Hotel Motel - 1.25 gpm - Rebate	10	Baseload	10.0%	90.2%	18	5,250		\$6.79	10.0%	90.2%	18
HWC-	Showerhead - Long Term Care and Retirement - 1.25 gpm & 1.5 gpm	10	Baseload	10.0%	90.2%	24	6.526		\$3.79	10.0%	90.2%	24
HWC-	Showerhead - Long Term Care and Retirement - 1.25 gpm & 1.5 gpm - Rebate	10	Baseload	10.0%	90.2%	24	6.526		\$6.79	10.0%	90.2%	24
BR HWC-	Showerhead - Other Commercial Institutional- 1.25 gpm	10	Baseload	10.0%	90.2%	24	6,700		\$3.79	10.0%	90.2%	24
HWC-	Showerhead - Other Commercial Institutional - 1 25 gnm - Rehate	10	Baseload	10.0%	90.2%	24	6 700		\$6.79	10.0%	90.2%	24
HWC	Showerhead - Multi Family - 1 25 gpm	10	Baseload	10.0%	53.1%	32	9 585		\$3.79	10.0%	53.1%	32
HWC-	Showerhead - Multi Family - 1 25 gpm - Rebate	10	Baseload	10.0%	53.1%	32	9 585		\$6.79	10.0%	53.1%	32
HW/C	Showerhead - Multi Family - 1.25 gpm - Replacement	10	Baseload	10.0%	53.1%	24	7 922		\$2.70	10.0%	53.1%	24
HWC	Showerhead - Multi Family - 1.25 gpm - Replacement Pehate	10	Baseload	10.0%	52.1%	24	7,555	-	\$6.79	10.0%	53.1%	24
Infrar	ad Heating - 20 to 00 MBtu/br	20	weather	22.0%	100.0%	Quasi	Quasi	Ouaci	Quasi	22.0%	100.0%	Ouaci
Infrar	ad Heating - 100 to 200 MBtu/br	20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	22.0%	100.0%	Quasi
MUA	Improved Efficiency 2000 to 5000/CEM - Multi Family, Long Term Care	15	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
MUA	Improved Efficiency over 2000CEM - Other Commercial	15	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
NALIA	VED 1700 to E000CEM. Other Commercial	15	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
NUCA -	VED avor 5000CEM. Other Commercial	15	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0% E 0%	100.0%	Quasi
Laund	w Woshing Equipment with Ozone _ <=120 lbs & 100 000 100 000 lbs/us	15	bacoload	9.0%	100.0%	Quasi	Quasi	Quasi	Quasi	9.0%	100.0%	Quasi
Laund	ry Washing Equipment with Ozone - <= 120 lbs & 100,000 = 135,355 lbs/ yr	15	baseload	0.0%	100.0%	Quasi	Quasi	Quasi	Quasi	0.0%	100.0%	Quasi
Launu	ry Washing Equipment with Ozone - < 120 lbs & >= 200,000 lbs/yi	15	baseload	0.0%	100.0%	Quasi	Quasi	Quasi	Quasi	0.0%	100.0%	Quasi
Launu Data Di	ry wasning Equipment with Ozone - > 120 lbs & 200,000 - 999,999 lbs/ yr	15	baseload	8.0%	100.0%	Quasi	Quasi	Quasi	Quasi	8.0%	100.0%	Quasi
Pre-Ri	nse Spray Nozzle - Full - 0.64gpm	5	baseload	0.0%	100.0%	1,280	252,000	-	\$150	0.0%	100.0%	1,280
Pre-Ri	nse Spray Nozzie - Full - 0.04gpm replacing existing 1.0gpm	5	baseload	0.0%	100.0%	457	97,292	-	\$150	0.0%	100.0%	457
Pre-Ri	nse Spray Nozzie - Limited - 0.64gpm	5	baseload	0.0%	100.0%	339	66,400	-	\$150	0.0%	100.0%	339
Pre-Ri	nse Spray Nozzie - Limited - U.64gpm replacing existing 1.6gpm	5	baseload	0.0%	100.0%	90	19,197	-	\$150	0.0%	100.0%	90
Pre-Ri	rise spray wozzie - Ocher - O.64gpm	5	uaseroad	0.0%	100.0%	318	62,200	-	\$150	0.0%	100.0%	518
Pre-Ri	nse Spray Nozzle - Other - 0.64gpm replacing existing 1.6gpm	5	baseload	0.0%	100.0%	109	23,166		\$150	0.0%	100.0%	109
Therm	nostat - Programmable - Ware, Ind, Rec, Agr	15	weather	20.0%	100.0%	108	-	29	\$110	20.0%	100.0%	108
Therm	iostat - Programmable - Food Service	15	weather	20.0%	100.0%	69	-	77	\$110	20.0%	100.0%	69
Therm	nostat - Programmable - Office, Institution, Education	15	weather	20.0%	100.0%	50	-	38	\$110	20.0%	100.0%	50
DCM Custo	m Agriculture Ind Baseload	Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual
Custo	m Application	Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual

Appendix B: 2011 DSM Spending by Program

2011 DSM Spending							
Sector	Program	<u>Pr</u>	rogram Costs	Ī	ncentive Costs		<u>Total</u>
	*New Home Construction	\$	1,934.21	\$	546.87	\$	2,481.08
	*Home Retrofit	\$	955,595.79	\$	1,741,244.13	\$	2,696,840
Residential	Total Residential	\$	957,530.00	\$	1,741,791.00	\$	2,699,321
	Low Income	\$	271,410.00	\$	1,457,768.00	\$	1,729,178.00
Low Income	Total Low Income	\$	271,410.00	\$	1,457,768.00	\$	1,729,178.00
	*New Building Construction	\$	106,328.02	\$ ¢	652,288.00	\$ ¢	758,616
Commorcial	Total Commercial	ې د	510 801 00	ې د	2,971,029.00	ې د	3,364,302
commerciar		<u>ې</u>	515,801.00	Ş	3,023,317.00	Ş	4,143,110
Distribution	Distribution Contract	\$	721,779.00	\$	8,014,800.00	\$	8,736,579
Contract	Total Distribution Contract	\$	721,779.00	\$	8,014,800.00	\$	8,736,579
Market	DWHR	\$	185,756.00	\$	1,385,764.00	\$	1,571,520
Transformation	Total Market Transformation	\$	185,756.00	\$	1,385,764.00	\$	1,571,520
Total	Program Sector Costs					\$	18,879,716
Other Direct	Salaries & Expenses Research & Evaluation					\$ \$	5,716,463 1,269,738
Program Costs	Administration					\$	48,946
Total 2011 DSM Spending \$ 25,914,863							
Program costs allocation between new and retrofit markets based on TRC generated by each program New build incentive allocation based on DSMT tracking of incentives							

Program		Measure	Net Natural Gas Savings (m³) per Unit	Units	Net Natural Gas Savings (m³)
			(a)	(b)	(c) = (a) * (b)
Residential		Faucet Aerator - Bath - 1.5gpm	4	234	941
New Homes	ESK	Faucet Aerator - Kitchen - 1.5gpm	13	53	675
New Homes		Showerhead - 1.25gpm	40	96	3,802
		Install - Faucet Aerator - Bath - 1.5gpm	3	503	1,597
		Install - Faucet Aerator - Kitchen - 1.5gpm	10	503	5,193
	FSK	Install - Pipe Insulation - 2m	14	503	7,214
		Install - Showerhead - 1.25gpm	29	398	11,545
		Install - Showerhead - 1.25gpm exist 2.6+	58	105	6,091
		Install - Showerhead - 1.25gpm - Replacement	17	80	1,344
		Pull - Faucet Aerator - Bath - 1.5gpm	2	60,394	104,708
Residential		Pull - Faucet Aerator - Kitchen - 1.5gpm	9	56,174	482,603
Existing	ESK	Pull - Pipe Insulation - 2m	10	56,174	582,009
Homes		Pull - Showerhead - 1.25gpm	18	61,276	1,084,802
		Pull - Showerhead - 1.25gpm - Replacement	17	3,207	53,875
		Push - Faucet Aerator - Bath - 1.5gpm	1	20,284	23,513
	FOI	Push - Faucet Aerator - Kitchen - 1.5gpm	7	19,584	129,035
	ESK	Push - Pipe Insulation - 2m	9	19,584	169,930
		Push - Showerhead - 1.25gpm	16	20,564	322,877
		Push - Showerhead - 1.25gpm - Replacement	21	1,488	31,065
	Therm	nostat - Programmable	30	10,717	323,761
		Total Residential	-	331,921	3,346,580
		HHC - Faucet Aerator - Bath	8	28,866	233,657
	FOI	HHC - Faucet Aerator - Kitchen	18	28,866	514,380
	ESK	HHC - Pipe Insulation - 2m	16	28,910	466,355
Low Income		HHC - Snowernead - 1.25gpm exist 2.0-2.5	36	12,341	441,464
	T 1	HHC - Snowernead - 1.25gpm exist 2.6+	68	16,351	1,118,958
	Inerr	hostat - Programmable - HHC	52	7,704	404,229
	vveat	nerization		400	514,499
	CEE -	Tior 2 Front Loading Clothes Wacher (ME)	105	123,488	3,093,341
	Conde	ansing Boiler	105	21	1 827 180
	Conde	ensing Doller ensing Gas Water Heater (1.000gal/day)	1 /73	14	64 832
	Custo	m Agriculture	1,475	8	392 675
	Custo	om New Construction		18	5 393
	DCK/	/ Fast Casual (< 5000 cfm)	4 561	2	9 122
	DCK\	/ Full Menu (5000 - 9999 cfm)	10.912	4	43.647
	Dishw	vasher - Rack Conveyor - Single High Temperature	1.608	7	11.257
Commercial	Dishw	vasher - Stationary Rack - High Temperature	495	5	2.476
New	Dishw	vasher - Stationary Rack - Low Temperature	673	2	1,346
Buildings	Dishw	vasher - Undercounter - High Temperature	481	10	4,806
-	Energ	y Star Front Load Clothes Washer	40	1	40
	Energ	y Star Fryer	866	15	12,996
	Energ	y Star Steam Cooker	2,579	1	2,579
	ERV			179	754,239
	HRV			180	939,077
	Infrare	ed Heating		275	383,146
	MUA			1	1,596
1		Total Commercial New Buildings		1 004	4 450 250

Appendix C: 2011 LRAM Results by Measure

	CEE Tier 2 Front-Loading Clothes Washer (MF)	105.3	1,367	143,945
	CEE Tier 2 Front-Loading Clothes Washer (Laundromat)	105.3	32	3,370
	Condensing Boiler		458	3,188,510
	Condensing Gas Water Heater (1,000gal/day)	1,473.5	72	106,088
	Custom Agriculture		3	79,006
	Custom Retrofit		262	1.944.792
	DCKV Fast Casual (< 5000 cfm)	4.561.0	1	4,561
	DCKV Full Menu (5000 - 9999 cfm)	10.911.7	8	87,294
	Destratification Fan		36	512,460
	Dishwasher - Rack Convevor - Single High Temperature	1.608.2	18	28,947
	Dishwasher - Stationary Rack - High Temperature	495.2	26	12 875
	Dishwasher - Stationary Rack - Low Temperature	672.8	142	95,538
	Dishwasher - Undercounter - High Temperature	480.6	14	6 728
	Energy Star Convection Oven	677.6	7	4 743
	Energy Star Front Load Clothes Washer	39.5	565	22 329
	Energy Star Fryer	866.4	131	113 498
	Energy Star Steam Cooker	2 579 2	4	10,317
	ERV		201	915,960
	High Efficiency Under-Fired Broiler	1 341 6	1	1 342
	HRV		140	397 724
	HWC - Bathroom Aerator - University College Dorms - 1.0 gpm	38	2 393	9.016
	HWC - Bathroom Aerator - Hotel Motel - 1.0 gpm	2.8	4 358	12 315
Commercial	HWC - Bathroom Aerator - Long Term Care and Retirement - 1.0 gpm	4.7	2 654	12,500
Fristing	HWC - Bathroom Aerator - Other Commercial Institutional - 1.0 gpm	3.8	1 445	5 444
Buildings	HWC - Bathroom Aerator - Multi Family - 1.0 gpm	2.4	11 892	28,971
2 and 190	HWC - Kitchen Aerator - University College Dorms - 1.5 gpm	10.6	1 593	16 931
	HWC - Kitchen Aerator - Other Commercial Institutional - 1.5 gpm	10.6	1,000	10,671
	HWC - Kitchen Aerator - Multi Family - 1.5 gpm	87	11 702	102 133
	HWC - Showerhead - University College Dorms - 1 25 gpm	26.0	2 651	68 882
	HWC - Showerhead - Hotel Motel - 1 25 gpm	14.6	4 616	67 466
	HWC - Showerhead - Long Term Care and Retirement - 1 25 gpm & 1.5 gpm	19.5	1,010	38 371
	HWC - Showerhead - Other Commercial Institutional- 1 25 gpm	19.5	1,000	28 218
	HWC - Showerhead - Multi Family - 1 25 gpm	15.3	12 931	197 602
	HWC - Showerhead - Multi Family - 1.25 gpm - Replacement	11.5	5 046	57 832
	Infrared Heating		717	918 022
	MIIA		13	68,837
	Laundry Washing Equipment with Ozone		63	368 194
	Pre-Rinse Spray Nozzle - Full - 0.640pm	1 286 0	165	212 190
	Pre-Rinse Spray Nozzle - Full - 0.64gpm replacing existing 1.6gpm	457.0	452	206 564
	Pre-Rinse Spray Nozzle - Limited - 0.64gnm	339.0	44	14 916
	Pre-Rinse Spray Nozzle - Limited - 0.64gpm replacing existing 1.6gpm	90.0	176	15,840
	Pre-Rinse Spray Nozzle - Other - 0.64gpm	318.0	57	18,010
	Pre-Rinse Spray Nozzle - Other - 0.64gpm replacing existing 1.6gpm	109.0	98	10,682
	Thermostat - Programmable - Ware Ind. Rec. Agr	86.4	2 959	255 658
	Thermostat - Programmable - Food Service	55.2	103	5 686
	Thermostat - Programmable - Office Institution Education	40	489	19 560
	Total Commercial Existing Buildings	+0	74 526	10 450 656
Distribution	Custom - Agriculture		107	10,430,030
Contract	Custom - DC		1 010	131 106 846
Markete	Total Distribution Contract Markets		1 125	141 753 196
markets	Total Distribution Contract Markets		532 064	163 703 221
			JJZ,004	103,703,231

Program		Measure	TRC	Per Unit	Units		Gross TRC	Pro	ogram Costs	Net	Program TRC
				(a)	(b)		(c) = (a) * (b)		(d)	(e)	= (c) - (d)
Residential		Faucet Aerator - Bath - 1.5gpm	\$	25.29	234	\$	5,916.88				
New Homes	ESK	Faucet Aerator - Kitchen - 1.5gpm	\$	78.96	53	\$	4,184.72				
		Showerhead - 1.25gpm	\$	239.21	96	\$	22,964.61				
		Install - Faucet Aerator - Bath - 1.5gpm	\$	19.91	503	\$	10,013.15				
		Install - Faucet Aerator - Kitchen - 1.5gpm	\$	65.61	503	\$	33,000.25				
	ESK	Install - Pipe Insulation - 2m	\$	26.83	503	\$	13,496.05				
	_	Install - Showerhead - 1.25gpm	\$	174.31	398	\$	69,376.30				
		Install - Showerhead - 1.25gpm exist 2.6+	\$	306.60	105	\$	32,193.00				
		Install - Showerhead - 1.25gpm - Replacement	\$	107.43	80	\$	8,594.11				
		Pull - Faucet Aerator - Bath - 1.5gpm	\$	10.72	60,394	\$	647,337.78				
Residential		Pull - Faucet Aerator - Kitchen - 1.5gpm	\$	54.45	56,174	\$	3,058,483.32				
Existing	ESK	Pull - Pipe Insulation - 2m	\$	19.12	56,174	\$	1,074,125.10				
Homes		Pull - Showerhead - 1.25gpm	\$	105.06	61,276	\$	6,437,469.65				
		Pull - Showerhead - 1.25gpm - Replacement	\$	107.43	3,207	\$	344,516.24				-
		Push - Faucet Aerator - Bath - 1.5gpm	\$	7.06	20,284	\$	143,159.27				
		Push - Faucet Aerator - Kitchen - 1.5gpm	\$	41.55	19,584	\$	813,808.64				
	ESK	Push - Pipe Insulation - 2m	\$	15.86	19,584	\$	310,619.95				
		Push - Showerhead - 1.25gpm	\$	92.79	20,564	\$	1,908,097.73				
		Push - Showerhead - 1.25gpm - Replacement	\$	134.33	1,488	\$	199,889.14				
	Thermo	stat - Programmable	\$	86.35	10,717	\$	925,364.94				
		Total Residential			331,921		16,062,611	\$!	957,530	\$	15,105,081
		HHC - Faucet Aerator - Bath	\$	52.01	28,866	\$	1,501,404				
		HHC - Faucet Aerator - Kitchen	\$	113.45	28,866	\$	3,274,748				
	ESK	HHC - Pipe Insulation - 2m	\$	30.27	28,910	\$	874,978				
Low Income		HHC - Showerhead - 1.25gpm exist 2.0-2.5	\$	213.13	12,341	\$	2,630,194				
		HHC - Showerhead - 1.25gpm exist 2.6+	\$	361.94	16,351	\$	5,918,055				
	Thermo	stat - Programmable - HHC	\$	148.04	7,704	\$	1,140,485				
	Weathe	Prization			450	N//	A				
		Total Low Income			123,488	\$	15,339,863.91	\$	271,410	\$	15,068,454
	CEE II	er 2 Front-Loading Clothes Washer (MF)	\$	656.18	27	\$	17,717				
	Conder	Ising Boiler			225	\$	3,569,812				
	Conder	ising Gas Water Heater (1,000gal/day)	\$	1,250.31	44	\$	55,014				
	Custom	Agriculture			8	\$	982,491				
	Custom	New Construction		0.007.54	18	\$	13,372				
	DCKV		\$	12,307.51	2	ş	24,615				
	DUKVI	-uli Menu (5000 - 9999 cm)	3 3	36,812.69	4	ъ ¢	147,251				
Commercial	Dishwa	sher - Rack Conveyor - Single High Temperature	\$	4 094 44	7	96	97,258				
Now	Dishwa	sher Stationary Rack - High Temperature	¢	4,904.41	5	96	24,922				
Ruildings	Dishwa	sher Undersounter, High Temperature	ф Ф	4,100.00	2	9 Q	0,211	<u> </u>			
Buildings	Disriwa	Ster Front Lood Clothes Weeker	¢	3,201.00	10	¢ ¢	32,619				
	Energy	Star Front Load Giolines Washer	ф Ф	219.43	1	¢ ¢	16 100				
	Energy	Star Steam Cooker	ф ¢	3 031 02	15	9 6	3 021	<u> </u>			
			φ	3,331.03	170	9 6	1 122 /22	<u> </u>			
			L		1/9	9	1,122,438	<u> </u>			
	Infrared	Heating	F		180	9 Q	907,709	<u> </u>			
	MIIA	i icaliiy			2/5	¢ ¢	1 021				
	MOA	Total Commercial New Buildings	5		1 004	\$	7 972 799 59	\$	106 328	\$	7 866 472
L					1,004	Ψ	1,012,100.09	Ψ	100,020	Ψ	1,000,472

Appendix D: 2011 TRC Results by Measure

	CEE Tier 2 Front-Loading Clothes Washer (MF)	\$ 656.18	1,367	\$ 896,997		
1	CEE Tier 2 Front-Loading Clothes Washer (Laundromat)	\$ 656.18	32	\$ 20,998		
	Condensing Boiler		458	\$ 6,229,622		
	Condensing Gas Water Heater (1,000gal/day)	\$ 1,250.31	72	\$ 90,022		
	Custom Agriculture		3	\$ 159,505		
	Custom Retrofit		262	\$ 5,133,194		
1	DCKV Fast Casual (< 5000 cfm)	\$ 12,307.51	1	\$ 12,308		
	DCKV Full Menu (5000 - 9999 cfm)	\$ 36,812.69	8	\$ 294,502		
	Destratification Fan		36	\$ 1,054,497		
	Dishwasher - Rack Conveyor - Single High Temperature	\$ 13,893.94	18	\$ 250,091		
	Dishwasher - Stationary Rack - High Temperature	\$ 4,984.41	26	\$ 129,595		
	Dishwasher - Stationary Rack - Low Temperature	\$ 4,105.50	142	\$ 582,981		
	Dishwasher - Undercounter - High Temperature	\$ 3,261.85	14	\$ 45,666		
	Energy Star Convection Oven	\$ 776.71	7	\$ 5,437		
	Energy Star Front Load Clothes Washer	\$ 219.43	565	\$ 123,981		
	Energy Star Fryer	\$ 1,074.70	131	\$ 140,786		
	Energy Star Steam Cooker	\$ 3,931.03	4	\$ 15,724		
	ERV		201	\$ 1,129,100		
	High Efficiency Under-Fired Broiler	\$ 1,906.65	1	\$ 1,907		
1	HRV		140	\$ 502,885		
	HWC - Bathroom Aerator - University College Dorms - 1.0 gpm	\$ 17.52	971	\$ 17,008		
	HWC - Bathroom Aerator - University College Dorms - 1.0 gpm - Rebate	\$ 14.82	1,422	\$ 21,068	ļ	
	HWC - Bathroom Aerator - Hotel Motel - 1.0 gpm	\$ 18.83	3,187	\$ 60,016		
	HWC - Bathroom Aerator - Hotel Motel - 1.0 gpm - Rebate	\$ 16.13	1,171	\$ 18,890		
1	HWC - Bathroom Aerator - Long Term Care and Retirement - 1.0 gpm	\$ 22.69	2,003	\$ 45,439		
1	HWC - Bathroom Aerator - Long Term Care and Retirement - 1.0 gpm - Rebate	\$ 19.99	651	\$ 13,011	ļ	
	HWC - Bathroom Aerator - Other Commercial Institutional - 1.0 gpm	\$ 19.68	1,373	\$ 27,020		
	HWC - Bathroom Aerator - Other Commercial Institutional - 1.0 gpm - Rebate	\$ 16.98	72	\$ 1,223		
	HWC - Bathroom Aerator - Multi Family - 1.0 gpm	\$ 15.14	10,880	\$ 164,769		
Commercial	HWC - Bathroom Aerator - Multi Family - 1.0 gpm - Rebate	\$ 12.44	1,012	\$ 12,594		
Existing	HWC - Kitchen Aerator - University College Dorms - 1.5 gpm	\$ 66.85	582	\$ 38,908		
Buildings	HWC - Kitchen Aerator - University College Dorms - 1.5 gpm - Rebate	\$ 64.15	1,011	\$ 64,858		
	HWC - Kitchen Aerator - Other Commercial Institutional - 1.5 gpm	\$ 66.85	976	\$ 65,248		
	HWC - Kitchen Aerator - Other Commercial Institutional - 1.5 gpm - Rebate	\$ 64.15	28	\$ 1,796		
	HWC - Kitchen Aerator - Multi Family - 1.5 gpm	\$ 54.69	10,556	\$ 577,297		
	HWC - Kitchen Aerator - Multi Family - 1.5 gpm - Rebate	\$ 51.99	1,146	\$ 59,579		
	HWC - Showerhead - University College Dorms - 1.25 gpm	\$ 136.68	1,256	\$ 171,668		
	HWC - Showerhead - University College Dorms - 1.25 gpm - Rebate	\$ 133.98	1,395	\$ 186,899		
	HWC - Showerhead - Hotel Motel - 1.25 gpm	\$ 81.50	3,759	\$ 306,354		
	HWC - Showerhead - Hotel Motel - 1.25 gpm - Rebate	\$ 78.80	857	\$ 67,531		
	HWC - Showerhead - Long Term Care and Retirement - 1.25 gpm & 1.5 gpm	\$ 104.69	1,483	\$ 155,257		
	HWC - Showerhead - Long Term Care and Retirement - 1.25 gpm & 1.5 gpm - Rebate	\$ 101.99	486	\$ 49,568		
1	HWC - Showerhead - Other Commercial Institutional- 1.25 gpm		1,288	a 137,259		
	HWC - Showerhead - Other Commercial Institutional - 1.25 gpm - Rebate	φ 103.87	160			
	HWC - Showerhead - Multi Family - 1.25 gpm	→ 80.96	11,368			
1	HWC - Showerhead - Wulti Family - 1.25 gpm - Kebate	φ 84.26 ¢ 60.00	1,563	φ 131,701 ¢ 216,501		
	HWC - Showerhead - Multi Family - 1.25 gpm - Replacement Pabeto	¢ 66.00	3,135	↓ ∠10,591		
1	Inforced Heating	φ 00.39	1,911	ψ 1∠0,008 ¢ 2147.940	1	
	MITA		/1/	¢ 2,147,649	1	
	Laundry Washing Equipment with Ozone		13	\$ 661 /02		
1	Pre-Rinse Snrav Nozzle - Full - 0.64nnm	\$ 3,306,84	165	\$ 545 620	1	
	Pre-Rinse Spray Nozzle - Full - 0.64gpm replacing existing 1.6gpm	\$ 1 139 54	452	\$ 515.073		
	Pre-Rinse Spray Nozzle - Limited - 0.640pm	\$ 761.02		\$ 33,073		
	Pre-Rinse Spray Nozzle - Limited - 0.64gpm replacing existing 1.6gpm	\$ 104.25	176	\$ 18 348		
	Pre-Rinse Spray Nozzle - Other - 0.64gpm	\$ 703.90	57	\$ 40 122		
	Pre-Rinse Spray Nozzle - Other - 0.64gpm replacing existing 1.6gpm	\$ 157.26	98	\$ 15 412	1	
	Thermostat - Programmable - Ware, Ind. Rec. Agr	\$ 147.35	2,959	\$ 436.005	1	
	Thermostat - Programmable - Food Service	\$ 100.14	103	\$ 10.314		
1	Thermostat - Programmable - Office, Institution, Education	\$ 36.83	489	\$ 18.011	i i	
	Total Commercial Existing Buildings		74,526	\$ 25,133,183	\$ 413,473	\$ 24,719,710
Distribution	Custom - Agriculture		107	\$ 11,608,701	,	,,
Contract	Custom - DC		1.018	\$ 312.767.928	1	
Markets	Total Distribution Contract Markets		1.125	\$ 324.376.629	\$ 721.779	\$ 323.654.850
	Total Program Results		532,064	\$ 388,885,086	\$ 2,470,520	\$ 386,414,566
	Other Direct Program Costs				\$ 7,035,147	
	2011 Total Net TRC					\$ 379,379,419

Appendix E: 2012 Avoided Costs

Inflation Factor	1.9%
Discount Rate	7.9%

	Gas Avoided Costs							Water an	d Electricit	y Avoided Co	sts	
	Residential/Commercial				Industrial			Reside	ential/Comn	nercial/Industrial		
	Baseload (m3)		Weather-Sen	sitive (m3)	Baseload	d (m3)		Water	(m3)	Electricity	r (kWh)	
	Rate	NPV	Rate	NPV	Rate	NPV		Rate	NPV	Rate	NPV	
1	0.19511	0.19511	0.18904	0.18904	0.19018	0.19018	1	2.05092	2.05092	0.09517	0.09517	
2	0.19966	0.38015	0.19835	0.37287	0.20123	0.37668	2	2.08989	3.98779	0.09698	0.18506	
3	0.21221	0.56242	0.21224	0.55517	0.21000	0.55705	3	2.12959	5.81696	0.09883	0.26994	
4	0.21684	0.73504	0.21830	0.72894	0.21590	0.72892	4	2.17006	7.54441	0.10070	0.35010	
5	0.22096	0.89805	0.22245	0.89306	0.22000	0.89123	5	2.21129	9.17581	0.10262	0.42581	
6	0.22516	1.05200	0.22667	1.04804	0.22418	1.04451	6	2.25330	10.71649	0.10457	0.49731	
7	0.22944	1.19739	0.23098	1.19441	0.22844	1.18927	7	2.29611	12.17149	0.10655	0.56483	
8	0.23380	1.33470	0.23537	1.33264	0.23278	1.32598	8	2.33974	13.54559	0.10858	0.62859	
9	0.23824	1.46437	0.23984	1.46318	0.23720	1.45509	9	2.38419	14.84328	0.11064	0.68881	
10	0.24276	1.58683	0.24440	1.58647	0.24171	1.57701	10	2.42949	16.06880	0.11274	0.74569	
11	0.24738	1.70248	0.24904	1.70289	0.24630	1.69216	11	2.47565	17.22618	0.11488	0.79940	
12	0.25208	1.81170	0.25377	1.81285	0.25098	1.80091	12	2.52269	18.31920	0.11707	0.85012	
13	0.25687	1.91484	0.25860	1.91669	0.25575	1.90361	13	2.57062	19.35145	0.11929	0.89802	
14	0.26175	2.01225	0.26351	2.01475	0.26061	2.00059	14	2.61947	20.32629	0.12156	0.94326	
15	0.26672	2.10424	0.26852	2.10737	0.26556	2.09219	15	2.66924	21.24692	0.12387	0.98598	
16	0.27179	2.19112	0.27362	2.19483	0.27061	2.17869	16	2.71995	22.11636	0.12622	1.02633	
17	0.27695	2.27317	0.27882	2.27743	0.27575	2.26038	17	2.77163	22.93745	0.12862	1.06443	
18	0.28221	2.35065	0.28411	2.35543	0.28099	2.33753	18	2.82429	23.71289	0.13106	1.10042	
19	0.28758	2.42383	0.28951	2.42910	0.28633	2.41039	19	2.87795	24.44520	0.13355	1.13440	
20	0.29304	2.49293	0.29501	2.49867	0.29177	2.47919	20	2.93263	25.13679	0.13609	1.16649	
21	0.29861	2.55820	0.30062	2.56438	0.29731	2.54417	21	2.98835	25.78993	0.13868	1.19680	
22	0.30428	2.61983	0.30633	2.62643	0.30296	2.60554	22	3.04513	26.40674	0.14131	1.22543	
23	0.31006	2.67804	0.31215	2.68503	0.30872	2.66350	23	3.10299	26.98926	0.14400	1.25246	
24	0.31595	2.73301	0.31808	2.74037	0.31458	2.71823	24	3.16195	27.53939	0.14673	1.27799	
25	0.32196	2.78492	0.32412	2.79263	0.32056	2.76992	25	3.22202	28.05892	0.14952	1.30210	
26	0.32807	2.83395	0.33028	2.84199	0.32665	2.81873	26	3.28324	28.54956	0.15236	1.32487	
27	0.33431	2.88025	0.33656	2.88860	0.33286	2.86483	27	3.34562	29.01293	0.15526	1.34637	
28	0.34066	2.92398	0.34295	2.93262	0.33918	2.90837	28	3.40919	29.45052	0.15821	1.36668	
29	0.34713	2.96527	0.34947	2.97419	0.34563	2.94948	29	3.47396	29.86378	0.16121	1.38585	
30	0.35373	3.00427	0.35611	3.01345	0.35219	2.98831	30	3.53997	30.25406	0.16428	1.40397	

i.

Audit Report on Union Gas Draft DSM 2011 Annual Report

Final Report

June 15, 2012



Eugene

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Staff at Cascade Energy, Inc. supported the audit by providing technical expertise in reviewing the engineering reports accompanying Union Gas' Draft DSM 2011 Annual Report. We appreciate the guidance and support of staff at Union Gas and the DSM Evaluation and Audit Committee.

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ABBREVIATIONS

Draft DSM 2011 Annual Report - Union Gas Draft DSM 2011 Annual Report
DSM – Demand Side Management
DSMVA - Demand Side Management Variance Account
EAC – Evaluation and Audit Committee
ECONW – ECONorthwest
Enbridge – Enbridge Gas Distribution
ESK – Energy Saving Kits
EUL – Effective Useful Life
HWC – Hot Water Conservation
IR - Infrared
LRAM – Lost Revenue Adjustment Mechanism
OEB – Ontario Energy Board
SSM – Shared Savings Mechanism
TEC – Technical Evaluation Committee
TRC – Total Resource Cost
Union – Union Gas Limited



EXECUTIVE SUMMARY

As per Union's request for audit, in regulation with OEB guidelines, ECONW was engaged in conducting an independent, third-party audit of Union's Draft DSM 2011 Annual Report.¹ To conduct the audit, the Audit Team (comprised of staff at ECONW and Cascade Energy, Inc.) reviewed Union's 2011 savings estimates and the calculations, assumptions, background materials, and other documentation supporting the results presented in the Draft DSM 2011 Annual Report.

This audit identifies instances in which the calculations and results presented in the Draft DSM 2011 Annual Report could be improved. All of the Audit Team's recommendations are discussed, in detail, in this report. To summarize, the Audit Team recommends the following changes to the Draft DSM 2011 Annual Report:

- Change the adjustment factors for the Commercial Multi-Family HWC Program to match those identified in the SeeLine verification study.
- Change the adjustment factors for the Commercial Non Multi-Family HWC Program to match those identified in the Energy verification study.
- Regarding the current use of natural gas hot water heaters, change all "Don't Know" responses collected through surveys supporting the Beslin verification study to "No" responses, and change the adjustment factors for the ESK Residential Push/Pull measures accordingly.
- Assume that all "Don't Know" responses collected in the Beslin verification study related to the use of low-flow showerheads indicate no use of low-flow showerheads, and change the adjustment factors for the ESK Residential Push/Pull measures accordingly.
- Correct the equations used to calculate the adjustment factors for the ESK Residential Push/Pull/Install Replacement measures.
- Change the adjustment factors for the ESK Residential Push Showerhead Replacement measures to accurately reflect those reported in Beslin's verification study.
- For the 2012 program year, begin tracking the number of two-stage IR (infrared) heater units installed, and use the gas savings assumptions for each type of heater rather than the blended gas savings across heater types.
- Investigate methods to disaggregate the blended incremental cost factor for IR heaters.
- Work with the Technical Evaluation Committee (TEC) to finalize free-ridership rates for new measures initiated in 2011, and develop a process for estimating free-ridership rates for new measures in the future.
- Decrease the EUL assumption for Condensing Boilers under 300 MBTU/h from 25 years to 22 years until the EUL of 25 years for this class of boilers is justified.
- Change the annual electricity savings rate for Condensing Make-up Air Units to accurately reflect industry practice.
- Use the audited realization rates to reflect the changes in savings for six of the Commercial Custom projects.

¹ Union Gas. 2012. Draft Demand Side Management 2011 Annual Report. April 2.

- For the 2012 program year, calculate realization rates using stratification weights from the sample drawn for verification. This approach is in line with industry best practices, and will improve the statistical accuracy of the realization rates.
- Given limited resources for DSM evaluation and verification, the Audit Team recommends improving coordination among Union staff and consultants to reduce duplicative and potentially unnecessary efforts regarding the estimation of realization rates.
- To improve the information available for Commercial Custom projects, the Audit Team makes the following recommendations:
 - Collect pre-project documentation of whether the project involves an expansion of production capacity.
 - Collect pre-project utility history for the facility or meter where the project will be affected.
 - Record baseline conditions (operating hours, operating usage, baseline equipment configuration, etc.).
 - Collect post-project documentation of what equipment and operating changes were made.
 - Record upgraded condition (operating hours, operating parameters, upgraded equipment configuration, etc.).

Table ES-1 summarizes how adjustments and recommendations identified in this audit impact the results presented in Union's Draft DSM 2011 Annual Report. In some instances, the recommendations listed above do not represent specific action items for the Draft DSM 2011 Annual Report, but rather represent recommendations for future actions relevant to next year's evaluation. Those recommendations are not reflected in Table ES-1.

Table ES-1. Summary of Adjustments

Measure	Description of Change	TRC Impact	SSM Impact (no cap)	LRAM Impact	Natural Gas Savings (m ³)
Prescriptive Measures					
HWC Commercial Multi-Family	Adj. Factor	+\$130,816	+\$5,178	+\$497	+20,533
HWC Commercial Non Multi-Family	Adj. Factor	+\$13,018	+\$515	+\$47	+2,034
ESK Residential Push/Pull/Install	Adj. Factor	-\$271,746	-\$10,756	-\$1,720	-65,447
Quasi-Prescriptive Measures					
Condensing Make-up Air Units	Electricity Savings	+\$10,482	+\$415	N/A	N/A
Custom Projects					
All Custom Adjustments	N/A	-\$84,114	-\$3,329	-\$450	-20,201
Total (All Adjustments)	N/A	-\$201,544	-\$7,977	-\$1,626	-63,079



I. INTRODUCTION

ECONW and Cascade Energy (Audit Team) were retained to perform an independent audit of the Draft DSM 2011 Annual Report.² To conduct the audit, the Audit Team reviewed Union's 2011 savings estimates and the calculations, assumptions, background materials, and other documentation (including relevant files for Custom projects) supporting the results presented in the Draft DSM 2011 Annual Report.

A. Audit Approach

The Audit Team's approach to the audit followed four general principles:

- **Review savings calculations for accuracy.** The preliminary review ensures that all *simple* errors applied in the basic savings calculations (e.g., incorrect cell references and/or application of free ridership adjustments) have been identified and recommendations for changes have been stated.
- **Review calculations for consistency with stated objectives.** The next level of review ensures that all factors that have been determined through earlier agreements with the OEB have been applied correctly.
- Review savings claims and related savings components for appropriate documentation. This level of review ensures that all supporting materials used for the Draft DSM 2011 Annual Report have been properly documented and applied.
- **Review overall processes used to determine annual savings.** This level of review ensures that the over-arching decisions made by Union Gas in producing the Draft DSM 2011 Annual Report were consistent with its objectives and with past efforts.

This audit focused on the 2011 program areas as defined in the Draft DSM 2011 Annual Report (see Table 1).

Sector	Program			
Residential	New Home ConstructionHome RetrofitMarket Transformation			
Low Income	Helping Homes Conserve (HHC)Weatherization			
Commercial	New Building ConstructionBuilding Retrofit			
Distribution Contract	Custom Projects			
Source: Union Gas. 2012. Draft DSM 2011 Annual Report. April. Pg. 7.				

Table 1. Sector Programs in the Draft DSM 2011 Annual Report

² Union Gas. 2012. Draft Demand Side Management 2011 Annual Report. April 2.
Table 2 contains all of the tasks the Audit Team completed while conducting the audit of the Draft DSM 2011 Annual Report.

Table 2. Checklist of Audit Process and Objectives	
Audit the Draft 2011 DSM Annual Report to identify if there are claims made by Union that have not been substantiated.	~
Review Union's procedures for tracking program participants and determine whether they lead to accurate counts.	~
Verify that Union's claimed input assumptions for SSM are accurate and consistent with the OEB filed and approved SSM input assumptions.	~
Verify that Union's claimed savings for LRAM are accurate and based on best available information at the time of the audit.	~
Verify that the calculation methodology used to determine the SSM incentive and the LRAM amount adheres to the OEB approved method.	~
Review third party verification of Commercial and Distribution Contract Custom projects for reasonableness. This review will not duplicate the detailed third party analysis of savings estimates and evaluation findings. Instead, the audit review will provide an opinion on the methods and parameters used in consideration of the OEB framework under which the programs operate.	V
Review and verify the appropriateness of the Market Transformation program claim and related shareholder incentive.	~
Review and provide an opinion on the DSMVA account.	 ✓
Review evaluation studies conducted in support of the DSM portfolio and provide recommendations on priority evaluations for 2012.	~

B. Summary of Findings

After reviewing the data contained in the Audit Tool, the verification reports, and other documentation, it is the opinion of the Audit Team that the data and information provided by Union conforms to the Audit Team's understanding of the guidelines established in the Decisions and Reasons Document (EB-2006-0021). Table 3 summarizes the overall impacts on net TRC, SSM (no cap), SSM (with cap), LRAM, and natural gas savings from all of the recommendations identified and discussed in this report.

	, ,		J
Account	Draft DSM 2011 Annual Report	2011 Audit Value	% Change
Net TRC	\$379,580,963	\$379,379,419	-0.05%
SSM (no cap)	\$9,773,825	\$9,765,848	-0.08%
SSM (with cap)	\$9,243,367	\$9,243,367	No Change
LRAM	\$822,251	\$820,625	-0.20%
Natural Gas Savings (m ³)	163,766,311	163,703,231	-0.04%

Table 3. Audit Adjustments to Net TRC, SSM, LRAM, and Natural Gas Savings

II. REVIEW OF SSM AND LRAM CALCULATIONS

The Audit Team reviewed the results of SSM and LRAM calculations as presented in the Draft DSM 2011 Annual Report. Union developed a Microsoft Excel-based tool (Audit Tool) to compile and organize relevant data from a database, and then to calculate TRC, net TRC, SSM, and LRAM. The Audit Team reviewed the Audit Tool in four ways:

- Reviewed the results presented in the Audit Tool to ensure that they match the values reported in the Draft DSM 2011 Annual Report.
- Reviewed the data and calculations in the Audit Tool to ensure there are no mechanical errors in how different values are computed.
- Reviewed the data and calculations in the Audit Tool to ensure they are consistent with OEB-approved methods.
- Reviewed the input data referenced in the Audit Tool to ensure that they are consistent with values presented in the Draft DSM 2011 Annual Report and evaluated other data-related concerns raised by the EAC.

LRAM values are calculated by multiplying total natural gas savings (m^3), at the rate class-level, by the relevant rate ($\frac{m^3}{m^3}$). The LRAM values are then halved to account for variability in installation timing (i.e., not all units were installed on January 1, 2011).

SSM values rely on a more complex set of variables and calculations. Table 4 summarizes the variables and functions used in the Audit Tool to calculate SSM. After reviewing the Audit Tool, we conclude that:

- All results from the Audit Tool match the values reported in the Draft DSM 2011 Annual Report.
- There are no mechanical errors in the Audit Tool.
- The Audit Tool's calculations are consistent with OEB-approved methods.
- Issues related to specific inputs used to calculate SSM and LRAM are discussed later in this report.

Table 4. Review of SSM Calculations

Prescriptive Results	Function of
Gas, Electricity, and Water Benefits (\$/Unit)	free-ridership; adjustment factor; energy load; equipment life; gas, electricity, and water savings; NPV of avoided costs
Participant Costs (\$/Unit)	free-ridership and incremental cost
Total Adjusted Gross TRC (\$)	gas, electricity, and water benefits, participant costs, and units
Net TRC (\$)	gross TRC and total program costs
SSM	net TRC and OEB-approved calculation
Custom Results	Function of
Custom Results Gas, Electricity, and Water Benefits (\$/Unit)	Function of free-ridership; adjustment factor; energy load; equipment life; gas, electricity, and water savings; NPV of avoided costs; realization rate
Custom Results Gas, Electricity, and Water Benefits (\$/Unit) Participant Costs (\$/Unit)	Function of free-ridership; adjustment factor; energy load; equipment life; gas, electricity, and water savings; NPV of avoided costs; realization rate free-ridership, incremental cost, and realization rate
Custom ResultsGas, Electricity, and Water Benefits (\$/Unit)Participant Costs (\$/Unit)Total Adjusted Gross TRC (\$)	Function of free-ridership; adjustment factor; energy load; equipment life; gas, electricity, and water savings; NPV of avoided costs; realization rate free-ridership, incremental cost, and realization rate gas, electricity, and water benefits, participant costs, and units
Custom Results Gas, Electricity, and Water Benefits (\$/Unit) Participant Costs (\$/Unit) Total Adjusted Gross TRC (\$) Net TRC (\$)	Function of free-ridership; adjustment factor; energy load; equipment life; gas, electricity, and water savings; NPV of avoided costs; realization rate free-ridership, incremental cost, and realization rate gas, electricity, and water benefits, participant costs, and units gross TRC and total program costs

III. REVIEW OF DSMVA CALCULATION

The DSMVA is calculated by subtracting DSM spending from the allocated DSM budget. Union may recover excess spending, up to 15 percent of the OEB-approved budget. Table 5 summarizes Union's DSM-related budget and spending for 2011. As shown in the final row, the DSMVA for 2011 is \$616,646.

Table 5. 2011 DSMVA Calculation				
	2011 Budget	2011 Spending		
Program Allocation				
Residential	\$3,139,000	\$2,699,321		
Low-Income	\$1,903,000	\$1,729,178		
Incremental Low-Income	\$2,465,000	\$2,055,783		
Commercial	\$5,666,000	\$4,143,118		
Distribution Contract	\$4,990,000	\$8,736,579		
Market Transformation	\$1,464,000	\$1,571,520		
Program Sub-total	\$19,627,000	\$20,935,498		
Other Allocations	\$7,727,000	\$7,035,147		
2011 Totals	\$27,354,000	\$27,970,646		
2011 DSMVA \$616,646				
Sources: Union Gas. 2012. Draft DSM 2011 Annual Report. April. Pg. 8: Union Gas. 2010. 2011 Demand				

Sources: Union Gas. 2012. Draft DSM 2011 Annual Report. April. Pg. 8; Union Gas. 2010. 2011 Demand Side Management Plan. May. Pg. 5.



IV. MEASURE-SPECIFIC AUDIT

This section describes the results of the measure-specific audit. In general, this component of the audit consisted of four tasks:

- Reviewed all verification studies completed in 2011.
- Compared results from verification studies with assumptions applied in the Draft DSM 2011 Annual Report.
- Reviewed all available documents describing input assumptions for Custom projects.
- Addressed specific issues raised by the EAC and Union.

The rest of this section is organized by measure type. First, it presents all recommendations and findings relating to prescriptive measures, followed by quasiprescriptive measures, and finally custom projects. Each recommendation is described in isolation, with brief text describing the basis for the recommendation, and a table showing how that recommendation impacts TRC, SSM, LRAM, and natural gas savings. In some instances, the audit uncovered multiple recommendations for the same set of measures. In these instances, the impacts of each recommendation on TRC, SSM, LRAM, and natural gas savings are not additive.

A. Prescriptive Measures

For prescriptive measures, the Audit Team reviewed the savings calculations and results, including major assumptions and evaluation research used to estimate savings. The adjustment factors are applied to modify savings estimates to reflect actual penetration, which is then used to calculate actual savings. The following changes pertain to the prescriptive measures' adjustment factors as taken from independent market research then applied to savings claim. The Audit Team also reviewed specific issues raised by the EAC in their review of the Draft DSM 2011 Annual Report.

1. Hot Water Conservation – Multi-Family (Data-Transfer Error)

The audit uncovered errors in transferring adjustment factors from the SeeLine verification study of the 2011 Commercial Multi-Family HWC Program³ to the Audit Tool and the Draft DSM 2011 Annual Report. Table 6 summarizes the adjustment factors reported in Table 9.5 of the Draft DSM 2011 Annual Report, the Audit Team's recommended changes based on the adjustment factors reported in the SeeLine verification study, and the impact on TRC, SSM, LRAM, and natural gas savings. The Audit Team recommends changing the adjustment factors to align with the results of the SeeLine verification study.

³ SeeLine Group Ltd. 2012. Verification Results: 2011 Commercial Multi-Family Hot Water conservation (HWC) Program Final Report. March.



Table 6. Hot Water Conservation – Multi-Family

Program/Measur	e	Draft DSM 2011 Annual Report Adjustment Factor	Audited Adjustment Factor
Bathroom Aerator	– 1.0gmp	60.61%	38.67%
Bathroom Aerator	– 1.0gpm - Rebate	60.61%	38.67%
Kitchen Aerator –	1.5gmp	38.67%	60.61%
Kitchen Aerator –	1.5gpm - Rebate	38.67%	60.61%
TRC Impact	SSM Impact (no cap)	LRAM Impact	Natural Gas Savings Impact (m ³)
+ \$130,816	+ \$5,178	+ \$497	+ 20,534

2. Hot Water Conservation – Non Multi-Family (Data-Transfer Error)

The audit uncovered an error in transferring data used to calculate adjustment factors from Energuy's verification study of the 2011 Commercial Non Multi-Family HWC Program⁴ to the Audit Tool and the Draft DSM 2011 Annual Report. Table 7 summarizes the adjustment factors used in the 2011 Draft Annual Report, the Audit Team's recommended changes to those adjustment factors, and the impact on TRC, SSM, LRAM, and natural gas savings. Table 9.7 in the Draft DSM 2011 Annual Report presents verification results for the Kitchen Aerator measure in Long Term Care and Retirement Facilities. Union has dropped this program from its portfolio, and will not claim any related savings. Therefore, excluding the verification results of the Kitchen Aerator measure in Long Term Care and Retirement Facilities increases the adjustment factor for the HWC Non Multi-Family Kitchen Aerator measure from 68.37 percent to 73.81 percent.

Program/Measure		Draft DSM 2011 Annual Report Adjustment Factor	Audited Adjustment Factor
University College Dorn	ns – 1.5gpm	68.37%	73.81%
University College Dorms – 1.5gpm Rebate		68.37%	73.81%
Other Commercial Institutional – 1.5gpm		68.37% 73.81%	
Other Commercial Institutional – 1.5gpm – Rebate		68.37%	73.81%
TRC Impact	SSM Impact (no cap)	LRAM Impact	Natural Gas Savings Impact (m ³)
+ \$13,018	+ \$515	+ \$47	+ 2,034

Table 7. Hot Water Conservation – Non Multi-Family (Kitchen Aerator)

⁴ Energuy Canada Ltd. 2012. *Verification Report for Hot Water Conservation Commercial Non Multi-Family.* February.



3. ESK Residential Push/Pull/Install

The Audit Team identified four recommendations related to various Energy Savings Kit (ESK) Residential Push/Pull/Install measures. ESKs are pre-packaged measures designed to help residential customers reduce energy use and water consumption. In all cases, these recommendations change the adjustment factors applied to the relevant measures. In some cases, multiple recommendations apply to the same adjustment factors. This section describes each of the Audit Team's four recommendations, the net impact of each recommendation (considered in isolation of other recommendations) is described in terms of TRC, SSM (no cap), LRAM, and natural gas savings. The net impact of all four recommendations, considered simultaneously is discussed at the end of the section.

ESK Residential Push/Pull (Survey Responses Regarding Homes with Natural Gas Hot Water Heaters)

As part of its verification of Union's ESK Residential Push/Pull measures in 2011,⁵ Beslin administered surveys to develop the adjustment factors used in the Audit Tool and the Draft DSM 2011 Annual Report. In its surveys, Beslin asked respondents whether or not they had natural gas hot water heaters. While most respondents knew if they did or did not have a natural gas hot water heater, some did not know. In applying the survey results, Union adopted the industry's standard approach and dropped these "Don't Know" responses from the sample and used the remaining results to estimate the percentage of the population with natural gas hot water heaters. By dropping the "Don't Know" responses, Union implicitly distributed those responses to "Yes" and "No" responses in proportion to the known respondents.

It is not possible to precisely determine, however, how many of these "Don't Know" respondents have or do not have natural gas hot water heaters. While dropping these responses from the sample may be the standard approach when conducting market research, it has the potential to inflate the savings associated with the program without evidence of actual savings. In instances like these, the Audit Team recommends making consistent assumptions that do not inflate savings without verified evidence of actual savings. Removing these "Don't Know" respondents suggests that 92.68 percent and 85.63 percent of Pull and Push respondents (respectively) have natural gas hot water heaters. Assigning these "Don't Know" responses to the "No" category decreases these percentages to 89.41 percent (Pull) and 82.53 percent (Push).

Considered in isolation of the Audit Team's other recommendations to these measures, this recommendation reduces the adjustment factors applied to the relevant measures. Again, in isolation of other recommendations to these measures, this recommendation decreases TRC by \$546,966, SSM (no cap) by \$21,649, LRAM by \$2,806, and natural gas savings by 107 (10³ m³) as reported in the Draft DSM 2011 Annual Report.

⁵ Beslin Communication Group, Inc. 2011. *Final Report Following An Audit in 2012 of the Union Gas ESK-Residential Pull Initiative;* Beslin Communication Group, Inc. 2011. *Final Report Following An Audit in 2012 of the Union Gas ESK-Residential Pull Initiative.*



ESK Residential Push/Pull (Survey Responses Regarding Use of Low-Flow Showerheads)

As part of its verification of Union's ESK Residential Push/Pull Showerhead measures in 2011, Beslin administered surveys to develop the adjustment factors used in the Audit Tool and the Draft DSM 2011 Annual Report. In its surveys, Beslin asked respondents how often they use their low-flow showerheads. While most respondents identified how often they used their showerheads, some were unsure. In applying the survey results, Union put these "Don't Know" responses in the lowest shower-use category (25 percent of the time).

It is not possible to precisely determine, however, how often these "Don't Know" respondents use their showerhead. In instances like these, the Audit Team recommends making consistent assumptions that do not inflate savings without verified evidence of actual savings. Union weighted the responses by the percentage of showerhead use. Placing "Don't Know" respondents into the lowest positive use-class suggests use rates of 86.96 percent (Push), 82.53 percent (Push Replacement), and 80.42 percent (Pull). Assigning these "Don't Know" responses to the "Never Use" category decreases these percentages to 86.68 percent (Push), 81.85 percent (Push Replacement), and 80.19 percent (Pull).

Considered in isolation of the Audit Team's other recommendations to these measures, this recommendation reduces the adjustment factors applied to the relevant measures. Again, in isolation of other recommendations to these measures, this recommendation decreases TRC by \$27,718, SSM (no cap) by \$1,097, LRAM by \$119, and natural gas savings by 5 (10³ m³) as reported in the Draft DSM 2011 Annual Report.

ESK Residential Push/Pull/Install (Calculation Error)

During the audit, Union uncovered an internal error in the equations it uses to calculate the number of verified installations. The equations reference an incorrect population, resulting in very low adjustment factors (which are used in the Audit Tool and the Draft DSM 2011 Annual Report). The Audit Team recommends correcting this error. Considered in isolation of the Audit Team's other recommendations to these measures, this recommendation increases the adjustment factors applied to the relevant measures. Again, in isolation of other recommendations to these measures, this recommendation increases TRC by \$293,340, SSM (no cap) by \$11,610, LRAM by \$1,165, and natural gas savings by 44 (10³ m³) as reported in the Draft DSM 2011 Annual Report.

ESK Residential Push (Calculation Error, ESK Push – Showerhead – 1.25pgm - Replacement)

The Audit Team uncovered an error in transferring data used to calculate adjustment factors from Beslin's verification study of the 2011 ESK Residential Push Initiative to the Audit Tool and the Draft DSM 2011 Annual Report. Beslin's verification study found that 97.33 percent of the ESK Push Showerhead – 1.25gpm – Replacements were still installed, yielding an adjustment factor of 34.84 percent. The Draft DSM 2011 Annual Report, on the other hand, shows that only 93.06 percent were still installed, yielding an adjustment factor of 34.84 percent. The Draft DSM 2011 Annual Report, on the other hand, shows that only 93.06 percent were still installed, yielding an adjustment factor of 34.84 percent. The Draft DSM 2011 Annual Report, on the other hand, shows that only 93.06 percent were still installed, yielding an adjustment factor of 33.31 percent. In isolation of other recommendations, this recommendation increases TRC by \$4,452, SSM (no cap) by \$176, LRAM by \$19, and natural gas savings by 1 (10³ m³), as reported in the Draft DSM 2011 Annual Report.

Summary of ESK Residential Push/Pull/Install Impacts

Table 8 summarizes the adjustment factors used in the Draft DSM 2011 Annual Report, the Audit Team's recommended changes, and the impact on TRC, SSM, LRAM, and natural gas savings. The results in Table 8 represent all four of the relevant recommendations considered simultaneously.

			-
Program/Measure		Draft DSM 2011 Annual Report	Audited Adjustment Factor
ESK - Install - Showerhead	d - 1.25gpm - Replacement	26.62%	56.56%
ESK - Pull - Faucet Aerato	or - Bath - 1.5pgm	44.71%	43.13%
ESK - Pull - Faucet Aerato	or - Kitchen - 1.5gpm	57.79%	55.75%
ESK - Pull - Pipe Insulation	n - 2m	62.15%	59.96%
ESK - Pull - Showerhead -	1.25gpm	46.48%	44.71%
ESK - Pull - Showerhead -	1.25gpm - Replacement	26.62%	56.56%
ESK - Push - Faucet Aerator - Bath - 1.5gpm		29.92%	28.84%
ESK - Push - Faucet Aera	tor - Kitchen - 1.5gpm	44.36%	42.76%
ESK - Push - Pipe Insulati	on - 2m	52.10%	50.21%
ESK - Push - Showerhead	l - 1.25gpm	41.27%	39.65%
ESK - Push - Showerhead - 1.25gpm - Replacement		33.31%	70.29%
TRC Impact	SSM Impact (no cap)	LRAM Impact	Natural Gas Savings Impact (m ³)
- \$271,746	- \$10,756	- \$1,720	- 65,447

Table 8. Adjustment Factors for the Residential ESK Program

B. Quasi-Prescriptive Measures

For the Quasi-Prescriptive measures, the Audit Team reviewed the savings calculations and results, including major assumptions and evaluation research used to estimate savings. The Audit Team also reviewed specific issues raised by the EAC in their review of the Draft DSM 2011 Annual Report.

1. Infrared Heaters

During conversations with Union and the EAC, the Audit Team was directed to consider three issues concerning measures associated with infrared (IR) heaters: (1) base-case technology of IR heater savings assessment, (2) sizing of IR heater units, and (3) market share of program participation. This section will address the base-case technology first, and then the sizing and market share issues jointly.

Base Case Technology of Heater Savings Assessment

After reviewing Agviro's assessment of IR heater savings,⁶ the Audit Team concludes that the newest (and most appropriate) base-case technology, according to Natural Resources Canada,⁷ is used to estimate the savings reported in the Draft DSM 2011

⁷ Natural Resources Canada. 2008. *Gas-fired Unit Heaters Energy Efficiency Regulations*. Retrieved from http://oee.nrcan.gc.ca/regulations/products/8110.



⁶ Agviro. 2004. Assessment of Average Infrared Heater Savings.

Annual Report. Union's measure sheets also appropriately use the < 80% thermal efficiency standard to calculate savings.

Sizing of Heaters and Market Share

The natural gas savings factor Union uses in determining energy savings from IR heater units is based on an average measurement of savings, weighted by the market share of three types of IR heater units (single-stage, two-stage, and high intensity). This factor also implicitly accounts for the size (thermal output in BTU/h) of the unit installed. The Audit Team was specifically asked to investigate:

- If market share percentages should be monitored so as to update the weighting components used to compute the average gas savings; and
- Whether or not unit oversizing matters in calculating the savings.

After conducting research to address these two matters, the Audit Team concludes that the *type* of IR heater unit installed has a significantly larger impact on gas savings than optimal *sizing*. Furthermore, two-stage IR heater units behave more similarly to an optimally-sized unit than do single-stage or high intensity heater units. Therefore, if more two-stage heater units are installed as replacement units, the issue of optimally-sized IR heater units becomes moot.

Currently, Union uses weighted averages based on the market share of each of the three types of IR heater units. The Audit Team contacted Nexant, author of the 2010 market share study, to gather a sense of any shifts in market share trends in IR heater units. Nexant collected data that described consumption of IR heater units by type of heater unit (single-stage, two-stage, and high intensity) and by consumer category (manufacturer, distributor, and contractor). Nexant found that, for two-stage heater units, there was more variation between the consumer categories as compared to the single-stage and high intensity heater units. In Nexant's opinion, the volatility and quality of existing survey data suggest that a similar study, conducted today, would reveal approximately the same results. At this time, the Audit Team has not found justification for adjusting the market share percentages of the three types of IR heater units as applied in the Draft DSM 2011 Annual Report.

Rather than periodically updating these market share percentages, the Audit Team recommends that Union track, as separate line items in the Audit Tool, the number of two-stage heaters installed each year. By tracking this information, Union would no longer rely on static market shares in its savings calculations. Instead, Union could use the appropriate savings factor for two-stage heaters (0.0242 m³/BTU/h) and the appropriate factor for single-stage and high intensity units (0.0144 m³/BTU/h).⁸ This approach ensures that future changes in preferences or programming are reflected in the savings associated with the three different types of IR heater units.

The Audit Team recognizes that tracking IR heater units by heater type for calculating savings also requires that incremental costs be disaggregated as well. While the measure sheet provides clear methods as to how the aggregated savings number was calculated, there is no supporting tabulation or description that shows how the aggregated

⁸ Savings factors come from the Navigant Measure Sheet.

incremental cost figure was calculated. The Audit Team recommends that Union investigate: 1) If it is possible to disaggregate the incremental cost factor, 2) The best methods as to how this disaggregation can take place.

2. New Quasi Prescriptive Programs

In 2011, Union implemented one new measure: Condensing Make-up Air Units (MUAs), and adopted Enbridge's substantiation values for one measure: Boilers under 300 MBTU/h. In previous filings, Union had grouped the savings inputs for the less than 300 MBTU/h boilers into a general class of boilers, which was approved by the EAC. The Audit Team identified three potential areas for recommendations regarding these two measures:

- Free-ridership rates applied to the two measures.
- EUL applied to Boilers under 300 MBTU/h.
- Electricity savings per unit applied to Condensing Make-up Air Units.

Free-Ridership Rates

To date, Union has not filed these two measures for negotiation with the OEB. When implementing new measures prior to OEB approval, Union applies free-ridership rates which have been negotiated with the OEB. In this instance, Union applied a free-ridership rate of five percent to the two new measures based on rates used by Enbridge. Per the EAC's request, the Audit Team looked for further justification for the free-ridership rate from other sources:

- Union's free-ridership rate is based on a negotiated agreement between Enbridge Gas Distribution and its interveners for the measure.
- While NYSERDA does not use a default free-ridership rate for new measures, it does use a default net-to-gross ratio of 90 percent for all new measures. The net-to-gross ratio is a function of the free-ridership rate and the spill-over ratio.
- Energy Trust of Oregon uses a free-ridership rate of zero percent for all new residential measures. For commercial and industrial applications, it uses a free-ridership rate equal to the three-year average (weighted by savings) of free-ridership rates at the program level. In 2011, Energy Trust of Oregon used free-ridership rates of 24 percent for new buildings, 36 percent for existing buildings, and 24 percent for production efficiency.
- California Public Utilities Commission's Database for Energy Efficient Resources (DEER) provides two examples of default net-to-gross ratios for new measures that lack sufficient data to estimate a free-ridership rate ranging from 60 to 70 percent.⁹

Without additional data (such as a measure-specific free-ridership study) the Audit Team cannot verify the free-ridership rates used for these two new measures. Furthermore, since free-ridership rates are so closely tied to the individual characteristics of each measure and the manner in which they are implemented, the Audit Team cannot propose a potentially more accurate rate. Given the relatively small savings associated with these two measures, as stated in the Draft DSM 2011 Annual

⁹ California Public Utilities Commission. 2008. *Database for Energy Efficient Resources*. Retrieved from http://www.deeresources.com/.

Report, changing the free-ridership rate would not change TRC enough to push the reported SSM beyond the cap. Since data are insufficient to recommend different free-ridership rates, and since applying different rates would have no impact on SSM, the Audit Team recommends accepting the five percent rate as reported in the Draft DSM 2011 Annual Report. Moving forward, however, the Audit Team recommends raising the issue of free-ridership rates for these two measures (as well as all new measures in the future) with the TEC.

Effective Useful Life (Boilers under 300 MBTU/h)

In its 2011 filing to the OEB, Enbridge prescribed an EUL of 25 years for Boilers under 300 MBTU/h. Historically, large boilers have typically exceeded their assumed EUL of 25 years. The boilers associated with this new measure, however, are much smaller, and do not yet have the proven history of large, conventional boilers. Furthermore, these smaller boilers are made of different, much thinner, materials than larger conventional boilers, suggesting that they may have a shorter EUL. Several sources suggest using an EUL for small boilers of 18–20 years.¹⁰ Without a verified EUL assumption for boilers of this size, the Audit Team recommends that Union apply an EUL of 22 years (the midpoint of what other utilities use, 18–25 years) for boilers under 300 MBTU/h. The Audit Team also recommends that Union monitor the relevant literature for verifiable EUL assumptions for boilers of this size. However, since Union had already filed a 25 year EUL for all boilers (which was accepted by the EAC), these recommendations for a 22 year EUL should be implemented for the 2012 program year.

Electricity Savings per Unit (Condensing Make-up Air Units)

In its 2011 proposal to OEB, Enbridge correctly states that the electrical demand of the motor is a function of the motor's horsepower, percent motor loading, motor efficiency, and control factor. Enbridge does not, however, show the values it used for these parameters. The relationship between fan speed and power is well documented (often referred to as the "fan law").¹¹ The fan law states that when an electric motor is powering a fan under ideal conditions, the fractional power use is equal to the fractional fan speed, raised to the third power. However, due to inefficiencies, savings are more accurately modeled by raising the fractional fan speed to the 2.7 power.

$$\frac{Power_{New}}{Power_{Baseline}} = \left(\frac{Fan \, Speed_{New}}{Fan \, Speed_{Baseline}}\right)^{2.7}$$

Applying this principle, typical values of motor efficiencies for small motors, and a motor load of 65 percent, results in electricity savings that are much greater than originally estimated by Enbridge. The Audit Team recommends changing the annual per unit electricity savings assumption used in the Audit Tool and reported in Union's

¹¹ See, for example, Prachyl, S. 2010. *Variable Frequency Drives and Energy Savings*. Siemens; Energy Star. 2012. *Variable Speed Fan Drives*. Retrieved on May 14, 2012 from http://www.energystar.gov/index.cfm?c=power_mgt.datacenter_efficiency_vsds.



¹⁰ See, for example, GDS Associates. 2009. *Natural Gas Energy Efficiency Potential in Massachusetts*. GasNetworks. April. California Public Utilities Commission. 2008. *Database for Energy Efficient Resources*. Retrieved from http://www.deeresources.com/.

Draft DSM 2011 Annual Report from 0.48 kWh/cfm to 1.09 kWh/cfm (see Table 9) for select Condensing Make-Up Air Units.

Table 9. Condensing Make-up Air Units (Electricity Savings Rate)				
Program/Measur	e	Draft DSM 2011 Annual Report Annual Electricity Savings Rate	Audited Annual Electricity Savings Rate	
Condensing Make-up Air Units Other Commercial Efficiency 1,700–5,999 cfm and greater than or equal to 6,000 cfm		0.48 kWh/cfm	1.09 kWh/cfm	
TRC Impact SSM Impact (no cap)		LRAM Impact	Natural Gas Savings Impact (m ³)	
+ \$10,482	+ \$415	N/A	N/A	

C. Custom Projects

For the Commercial and Distribution Contract Custom projects, the Audit Team reviewed the realization rates and engineering reports (including input assumptions and values) that Union used to estimate the savings presented in the Draft DSM 2011 Annual Report. The Audit Team coordinated with the statistical and engineering consultants responsible for conducting the third-party verifications of the savings and realization rates used in preparing the Draft DSM 2011 Annual Report. The Audit Team also reviewed specific issues raised by the EAC in their review of the Draft DSM 2011 Annual Report.

1. Engineering Review

Commercial Custom Projects

For Commercial Custom projects, the Audit Team reviewed the Michaels verification study on Union's Commercial and Industrial Custom projects.¹² The stated purpose of the Michaels study was to verify the reported savings, project costs, and EULs on a representative sample of Union's Commercial Custom projects. Michaels also performed a desk review of each project's documentation and savings calculations, and completed on-site project verifications. The purpose of this component of the audit is to:

- Review the engineering approach.
- Ensure compliance with engineering best practices.
- Verify calculated savings.
- Compare claimed savings from natural gas, water, and electricity to the savings Michaels found as a result of its review of these projects.

Of the 25 projects included in its verification study, Michaels reviewed 20 of them using phone interviews; Michaels reviewed the other five projects using on-site visits to verify

¹² Michaels Energy. 2012. Union Gas 2011 Commercial and Industrial Markets Project Verification Final Report. March.

installed equipment and operating parameters. The on-site reviews used the current operating information to calculate the corresponding natural gas, water, and electrical savings. To review the results of the Michaels verification study, the Audit Team followed these steps:

- The Audit Team reviewed the documentation and calculations reported in the Michaels verification study.
- Where engineering approaches or methodologies were unclear, the Audit Team communicated with Michaels for clarification.
- Where data from Michaels were insufficient to justify its approach, or other errors were uncovered, the Audit Team made recommendations for changes in the Draft DSM 2011 Annual Report.

After completing the steps described above, the Audit Team has five recommendations for changes to the inputs used in calculating savings from Commercial Custom projects:

- **Project 203 (Natural Gas Savings).** In calculating the savings associated with this project, the Michaels study inaccurately interpreted the assumptions used in the baseline data, and subsequently generated an overly conservative model. After clarifying and adjusting the assumptions and baseline data, the natural gas savings increase by 24 percent from 45,217 m³ to 56,074 m³.
- **Project 207 (Electrical Savings).** Projected electrical motor savings are based on the time a motor is used, and the average load placed on that motor during that time. The Michaels study uses a 90 percent load factor to calculate electrical savings. The Audit Team's experience has shown that a load factor of 70 percent is more realistic. Changing the load factor from 90 percent to 70 percent reduces calculated savings by 23 percent, from 118,715 kWh/year to 91,711 kWh/year.
- **Project 210 (Natural Gas Savings).** Insulating the thermal oil heater tank and the distribution piping can conserve natural gas. For this project, the Michaels study overestimated the size of the heater tank. Using a more accurate size reduced natural gas savings by 55 percent, from 156,237 m³ to 70,140 m³.
- **Project 238 (Natural Gas Savings).** The Michaels study used static air density (which is a function of temperature) to calculate savings. In this instance, applying dynamic air density values alongside variable heat recovery effectiveness (which is a function of actual temperature difference) is more appropriate. Applying these new assumptions increases the natural gas savings from 6,684 m³ to 48,772 m³.
- **Project 240 (Natural Gas Savings).** When steam traps leak, there are repercussions throughout the boiler system. Most notably, feed water flow must increase by more than just the amount lost from the leaks it must also increase to account for the increased volume of boiler blowdown. Conversely, reducing steam leaks reduces the amount of feed water that must be heated (and natural gas that is required to heat the feed water) by more than just the volume of water lost to the leaks. Assuming a typical blowdown rate of 10 percent results in an increased savings of natural gas by 13 percent, from 105,132 m³/year to 118,569 m³/year.

• **Project 240 (Water Savings).** As explained above, reducing steam leaks reduces the amount of feed water by more than just the volume of water lost to the leaks because it also reduces the amount of water lost through boiler blowdown. Assuming a typical blowdown rate of 10 percent results in an increased water savings 12 percent, from 318,876 L/year to 356,471 L/year.

Table 10 summarizes the changes described above. The table shows the estimated savings for each of the projects described above, Michaels' verified savings and the audited savings

Project	Technology	Ex Ante Savings Volume	Verified Savings Volume	Project Savings Rate	Audited Savings Volume	Audited Project Savings Rate
203 Gas (m ³)	HVAC	66,623	45,217	67.9%	56,074	84.0%
207 Electrical (kWh)	Process	69,031	118,715	172.0%	91,711	132.9%
210 Gas (m ³)	Process	240,179	156,237	65.1%	70,140	29.2%
238 Gas (m ³)	HVAC	229,185	6,684	2.9%	48,772	21.0%
240 Gas (m ³)	Process	100,428	105,132	104.7%	118,569	118.1%
240 Water (L)	Process	308,942	318,876	103.2%	356,471	115.4%
Note: The Project Savings Rate value is the ratio of the Verified Savings to Ex-Ante Savings. The Audited Project Savings Rate value is the ratio of the Audited Savings to Ex-Ante Savings.						

Table 10. Audit Results for Commercial Custom Projects

Distribution Contract Custom Projects

For Distribution Contract (DC) Custom projects, the Audit Team reviewed the Diamond verification report of Union's DC Custom projects.¹³ Diamond completed on-site verification visits to each of the 13 Custom projects included in the sample. The facilities included in the Diamond verification study ranged from an oil refinery to a university campus to a large greenhouse facility. The purpose of this component of the audit is to:

- Review the data and assumptions (including incremental costs and EUL) used to describe baseline and upgraded equipment.
- Review the energy savings calculations for natural gas, water, and electrical savings.

To review the results of the Diamond verification study, the Audit Team followed these steps:

- The Audit Team reviewed the documentation and calculations in the Diamond verification study.
- Where engineering approaches or methodologies were unclear, the Audit Team communicated with Diamond for clarification.
- If data from Diamond were insufficient to justify its approach, or other errors were uncovered, the Audit Team made recommendations for changes in the Draft DSM 2011 Annual Report.

¹³ Diamonds Engineering. 2012. 2011 Evaluation of Distribution Contract Custom Projects. March.

After this review, Diamond and the Audit Team resolved all questions. The Audit Team agrees with the energy savings calculated by Diamond, and has no recommendations for adjustments to the realizations rates from the Diamond verification study.

General Recommendations for Custom Projects

The realization rates reported in the Michaels and Diamond verification studies suggest that the information available for the small Commercial Custom projects is less thorough and less reliable than the information available for large Custom projects. Nine of the Commercial Custom projects have realization rates of 25 percent or less. To improve the information available for Commercial Custom projects, the Audit Team makes the following recommendations:

- Collect pre-project documentation of whether the project involves an expansion of production capacity.
- Collect pre-project utility history for the facility or meter where the project will be affected.
- Record baseline conditions (operating hours, operating usage, baseline equipment configuration, etc.).
- Collect post-project documentation of what equipment and operating changes were made.
- Record upgraded condition (operating hours, operating parameters, upgraded equipment configuration, etc.).

2. Realization Rates

Audited Realization Rates

Realization rates are estimated parameters used to extrapolate audited savings from a *sample* of Custom projects to *all* Custom projects. These rates affect claimed program outcomes such as energy savings, incremental costs, and EULs. As such, realization rates affect the calculation of TRC, SSM, and LRAM. The Audit Team recalculated the realization rates based on the audited values of savings for the Commercial Custom projects listed above. These audited realization rates are listed in Table 11. Since the Audit Team found no reason to change verified savings in the sample of DC Custom projects, the realization rates for DC Custom savings remain unchanged from those reported in the Draft DSM 2011 Annual Report.

Program/Measure		Draft DSM 2011 Annual Report Realization Rate	Audited Realization Rate
Natural Gas Savings –	Commercial Custom	0.665	0.659
Natural Gas Savings – DC Custom		1.096	1.096
Water Savings – Commercial Custom		0.862 0.863	
Water Savings – DC Custom		1.076	1.076
Electricity Savings – Commercial Custom		0.817	0.797
Electricity Savings – DC Custom		1.078	1.078
TRC Impact	SSM Impact (no cap)	LRAM Impact	Natural Gas Savings

Table 11. Audited Realization Rates



			Impact (m ³)
-\$84,114	-\$3,329	-\$450	-20,201

Precision Level Audit

Navigant Consulting measured precision levels for realization rates associated with Union's Commercial Custom and DC Custom projects and reported them in its April 18, 2012 memorandum (herein referred to as "Navigant Precision Memo"). The Audit Team's initial efforts focused on determining if the realization rates Union reports in its Draft DSM 2011 Annual Report do, in fact, fall within the precision levels reported in the Navigant Precision Memo. The Audit Team notes that the precision levels Navigant reports (reproduced in Table 12 below) are *realized precision levels*, which are the relative precision levels attained after the sample is drawn and verified. This distinction is made from the ex-ante precision levels assumed in the sampling methodology for determining the sample size. Navigant sets that ex-ante level at 15 percent.

The Audit Team verified that the reported realization rates for natural gas and water savings for Custom projects fall within the calculated precision levels put forth in the Navigant Precision Memo. However, realization rates for electricity savings fall below the precision interval for those rates. Table 12 compares realization rates reported in the Draft DSM 2011 Annual Report with those reported in the Navigant Precision Memo.

Savings Type	Reported Realization Rate	Navigant Realization Rate	Navigant Achieved Precision Level	Precision Interval
Natural Gas Savings				
Commercial Custom	0.6649	0.73	14%	0.628–0.832
DC Custom	1.0962	1.06	15%	0.901-1.219
Water Savings				
Commercial Custom	0.8624	0.86	1%	0.851-0.869
DC Custom	1.0762	1.07	36%	0.685–1.455
Electricity Savings				
Commercial Custom	0.8166	0.92	8%	0.846-0.994
DC Custom	1.0775	1.48	4%	1.421-1.539

Table 12. Comparison of Reported Realization Rates to Navigant's Achieved Precision Levels

Source: Union Gas. 2012. Draft DSM 2011 Annual Report. April. Pg. 78-79; Navigant Consulting. 2012. Navigant Precision Memo. April 18, 2012.

Notes: ECONW calculated the upper and lower bound values using Navigant's realization rates and precision levels.

Navigant produced new Achieved Precision Levels with the audited savings number. The new calculations did not change from previous calculations in any manner of significant digits already reported. Thus, Navigant's previously reported rates and precision numbers do not vary with audited values.

Given that the realization rates reported in the Draft DSM 2011 Annual Report for electricity savings were outside – i.e., below – the precision levels reported in the



Navigant Precision Memo, the Audit Team reviewed the methodologies used to calculate each set of realization rates. The Audit Team noted the differences in the realization rates used in the Audit Tool (the values in the first column in Table 12) and those in the Navigant Precision Memo (the values in the second column in Table 12), for both gas and electricity savings; especially since the reported realization rates for electricity fell below the precision bound. To better understand the source of the difference between these two sets of rates, the Audit Team reviewed the process by which Custom projects are selected and verified, as well as the methodology used to estimate the reported realization rates.

The process Union employed for verifying Custom projects for the Draft DSM 2011 Annual Report was consistent with the process it has employed in the past. Specifically, for the Draft DSM 2011 Annual Report, the verification process consisted of the following steps:

- Navigant drew a stratified random sample of projects to verify. This sampling method has been approved by Union and the EAC.¹⁴
- Data for the sample projects were provided to two consultants (Diamond Engineering Company and Michaels Energy) who verified the utility savings for the Draft DSM 2011 Annual Report. These consultants reported the verified savings to Union, as well as their calculated realization rates.
- Union delivered the verification data to Navigant. Navigant then computed its estimate of the precision levels, and the realization rates that generate those precision levels
- Union reported the realization rates from the engineering consultants and the precision levels from Navigant in the Draft DSM 2011 Annual Report.

Diamond and Michaels estimated the realization rates reported in the Draft DSM 2011 Annual Report. To calculate these realization rates, they divided the audited utility savings from the sample of projects by the claimed savings for those projects. In estimating these realization rates, the two firms treated the drawn sample of verified projects as a simple random sample from the population of all Custom projects. Navigant estimated realization rates, as well as relative precision levels, by ratio estimation methods (these realization rates are not reported in the Draft DSM 2011 Annual Report). This method incorporates weighting factors, constructed from the stratification process, to account for the heterogeneous population of Custom projects. The Audit Team has reviewed Navigant's methods and has found them to be accurate and correct.

From a statistical standpoint, the Audit Team finds that the differences between the realization rates reported in the Draft DSM 2011 Annual Report and those reported in the Navigant Precision Memo are due to the methodologies used to estimate them. Given the accepted stratified sampling procedure used to generate the verified project sample, Navigant's method of estimation is a sound practice, and produces the best,

¹⁴ Navigant Consulting. 2008. Sampling Methodology for Engineering Reviews of Custom Projects. April.

unbiased estimate of the realization rates for the population.¹⁵ Moreover, Navigant has used this methodology in similar verification studies for utility DSM programs elsewhere.¹⁶ The Audit Team understands that the methodologies used for calculating realization rates are being investigated for the first time. Therefore, the Audit Team understands that the current process of using realization rates derived from one statistical method, and precision values from another, is a product of inherited practice. However, the current procedures can easily be streamlined to consolidate responsibilities.

The Audit Team recommends that Union make the following changes to the process of calculating realization rates for the 2012 program year:

- Draw the sample of Custom projects to be verified.
- Verify the savings of those projects.
- Calculate the realization rates from the verified data using the appropriate sample stratification weights and use the rates in the Draft DSM Annual Report.
- Audit verified savings.
- Re-calculate the realization rate from the audited data using appropriate sample stratification weights and use these rates in the Final DSM Annual Report.
- Conduct confidence precision levels after audited savings are calculated.

The Audit Team believes that these steps will improve the statistical accuracy of the realization rates, and would be in line with industry best practices. Given limited resources for DSM evaluation and verification, the Audit Team recommends improving coordination among Union staff and consultants to reduce duplicative and potentially unnecessary efforts regarding the estimation of realization rates.

The Audit Team recognizes that the audited realization rates presented in Table 12 are calculated from the methodology used by the engineering consultants. The Audit Team also notes that the TRC, SSM, LRAM, and gas savings number reported herein do no reflect the adoption of the stratified realization rates. Since applying the stratified realization rates does not affect capped SSM, the recommendation to adopt these rates should be bundled with the recommendations to improve the process starting in the 2012 program year.

V. SCORECARD AUDIT

Up to this point, this report has focused on TRC-related programs. In addition to these programs, Union implements other programs (with separate funding). This section contains the Audit Team's review of the Market Transformation Scorecard and the Low-Income Weatherization Scorecard.

¹⁵ Expert panels from other utilities have reviewed and approved this method. See, for example, TecMarket Works. 2004. *The California Evaluation Framework*. Project No. K2033910. Pg. 356. For discussion on the unbiased properties of the procedure, see, for example, Lohr, S. 1999. "Sampling: Design and Analysis."

¹⁶ Navigant Consulting. 2011. *Energy Efficiency/Demand Response Plan Year* 2. AEP Ohio. March. Retrieved on May 15, 2012 from http://dis.puc.state.oh.us/TiffToPDf/ A1001001A11C16B02413C41830.pdf.

A. Market Transformation Scorecard

The Audit Team reviewed the work Union has completed to show progress on its Market Transformation Program. Since 2007, Union's Market Transformation Program has targeted Drain Water Heat Recovery (DWHR) technology, and as stated in the Draft DSM 2011 Annual Report, Union will exit the program this year. Union's methods for measuring program performance, as presented in the Draft DSM 2011 Annual Report, are consistent with its approach in 2010.

Union relied on two metrics to measure performance: (1) the number of participating builders as tracked by the program, and (2) the overall number of units installed as a percentage of residential new attachments as tracked by the program and available residential new attachments for Union's franchise. Table 13 summarizes the results from the Market Transformation Scorecard, as reported in the Draft DSM 2011 Annual Report (with a revision to the overall score from 150/150, as reported in the Draft DSM 2011 Annual Report Annual Report, to 150/100).

The Audit Team assumes that the actual results reported in the Scorecard (137 participating builders and 2,691 units installed) are tracked by internal program databases, and that they are accurate. The Audit Team did not attempt to verify the builder enrollment or units installed as part of this audit. The metric value levels (reported in the second, third, and fourth columns of the table) show the required results needed to meet 50, 100, and 150 percent of the performance metric. In both cases, the actual results exceeded the 150 percent metric value level.

Metric	Metric Value Levels				Actual		
Weighting	50%	100%	150%	Weight	Results	Payout %	Score
Participating Builders	122	128	133	20%	137	150	30/20
Units Installed (new build) as a percentage of 2011 residential new attachments	15.72% or 2011 units	17.72% or 2267 units	19.72% or 2522 units	80%	2691	150	120/80
Overall Results					\$500,000	150%	150/100
Source: Union Gas	. 2012. Draft	DSM 2011 An	nual Report. /	April. Pg. 70).		

Table 13. 2011 Market Transformation Scorecard Results (Revised)

The Audit Team also reviewed the actions taken on recommendations from past audits. In 2010, Union removed two metrics from its analysis of program performance. The two metrics described customer and builder awareness of the technology as determined through a market survey. The 2010 Audit recommended that Union re-institute the annual awareness surveys, as awareness is a leading indicator of market transformation. If, in the future, Union initiates a new Market Transformation Program, the Audit Team recommends that Union re-instate efforts to measure changes in awareness. The Audit Team does not recommend that Union use awareness metrics to claim savings, but rather, emphasizes the usefulness of tracking changes in awareness over time.

B. Low-Income Weatherization Scorecard

As stated in the Draft DSM 2011 Annual Report, Union received additional funding for a new incremental Low-Income Weatherization Program. Savings from this program are not factored into the SSM and LRAM calculations and do not influence TRC. To evaluate this program, Union creates a Scorecard (like the one for the Market Transformation Program). Table 14 summarizes the results from the Low-Income Weatherization Scorecard, as reported in the Draft DSM 2011 Annual Report. The Audit Team assumes that the actual results reported in the Scorecard (450 participants and 514,499 m³ in natural gas savings) are tracked by internal program databases, and that they are accurate. The Audit Team did not attempt to verify enrollment or savings as part of this audit. The metric value levels (reported in the second, third, and fourth columns of the table) show the required results needed to meet 50, 100, and 150 percent of the performance metric. After weighting the results of the two metrics, Union scored 135.9/100, for a total incentive payout of \$543,600.

Metric	Met	ric Value Lev	vels		Actual		
Weighting	50%	100%	150%	Weight	Results	Payout %	Score
Weatherization Participants	300	400	450	50%	450	150	75/50
Total Natural Gas Savings (m ³)	366,000	488,000	549,000	50%	514,499	121.7	60.9/50
Overall Results					\$543,600	136%	135.9/100
Source: Union Gas	2012 Draft	DSM 2011 A	nual Report	April Pa	28		

Table 14. 2011 Low-Income Weatherization Scorecard Results

VI. SUMMARY

As per Union's request for audit, in regulation with OEB guidelines, ECONW was engaged in conducting an independent, third-party audit of Union's Draft DSM 2011 Annual Report. To conduct the audit, the Audit Team reviewed Union's 2011 savings estimates and the calculations, assumptions, background materials, and other documentation (including relevant files supporting Custom projects) supporting the results presented in the Draft DSM 2011 Annual Report.

This report presents the Audit Team's recommendations for changes to the Draft DSM 2011 Annual Report as well as procedural changes for future verification and reporting. To summarize, the Audit Team recommends the following:

- Change the adjustment factors for the Commercial Multi-Family HWC Program to match those identified in the SeeLine verification study.
- Change the adjustment factors for the Commercial Non Multi-Family HWC Program to match those identified in the Energy verification study.
- Regarding the current use of natural gas hot water heaters, change all "Don't Know" responses collected through surveys supporting the Beslin verification study to "No" responses, and change the adjustment factors for the ESK Residential Push/Pull measures accordingly.
- Assume that all "Don't Know" responses collected in the Beslin verification study related to the use of low-flow showerheads indicate no use of low-flow

showerheads, and change the adjustment factors for the ESK Residential Push/Pull measures accordingly.

- Correct the equations used to calculate the adjustment factors for the ESK Residential Push/Pull/Install Replacement measures.
- Change the adjustment factors for the ESK Residential Push Showerhead Replacement measures to accurately reflect those reported in Beslin's verification study.
- For the 2012 program year, begin tracking the number of two-stage IR (infrared) heater units installed, and use the gas savings assumptions for each type of heater rather than the blended gas savings across heater types.
- Investigate methods to disaggregate the blended incremental cost factor for IR heaters.
- Work with the TEC to finalize a free-ridership rate for new measures initiated in 2011 and develop a process for estimating free-ridership rates for new measures in the future.
- Decrease the EUL assumption for Condensing Boilers under 300 MBTU/h from 25 years to 22 years until the EUL of 25 years for this class of boilers is justified. Change the annual electricity savings rate for Condensing Make-up Air Units to accurately reflect industry practice.
- Use the audited realization rates to reflect the changes in savings for six of the Commercial Custom projects.
- For the 2012 program year, calculate realization rates using stratification weights from the sample drawn for verification. This approach is in line with industry best practices, and will improve the statistical accuracy of the realization rates.
- Given limited resources for DSM evaluation and verification, the Audit Team recommends improving coordination among Union staff and consultants to reduce duplicative and potentially unnecessary efforts regarding the estimation of realization rates.
- To improve the information available for Commercial Custom projects, the Audit Team makes the following recommendations:
 - Collect pre-project documentation of whether the project involves an expansion of production capacity.
 - Collect pre-project utility history for the facility or meter where the project will be affected.
 - Record baseline conditions (operating hours, operating usage, baseline equipment configuration, etc.).
 - Collect post-project documentation of what equipment and operating changes were made.
 - Record upgraded condition (operating hours, operating parameters, upgraded equipment configuration, etc.).

Table 15 summarizes how adjustments and recommendations identified in this report impact the results presented in the Draft DSM 2011 Annual Report. In some instances, the recommendations listed above do not represent specific action items for the Draft DSM 2011 Annual Report. Those recommendations are not reflected in Table 15, but rather represent recommendations for future actions relevant to next year's evaluation.

Table 15. Summary of Adjustments

Measure	Description of Change	TRC Impact	SSM Impact (no cap)	LRAM Impact	Natural Gas Savings (m ³)
Prescriptive Measures					
HWC Commercial Multi-Family	Adj. Factor	+\$130,816	+\$5,178	+\$497	+20,533
HWC Commercial Non Multi-Family	Adj. Factor	+\$13,018	+\$515	+\$47	+2,034
ESK Residential Push/Pull/Install	Adj. Factor	-\$271,746	-\$10,756	-\$1,720	-65,447
Quasi-Prescriptive Measures					
Condensing Make-up Air Units	Electricity Savings	+\$10,482	+\$415	N/A	N/A
Custom Projects					
All Custom Adjustments	N/A	-\$84,114	-\$3,329	-\$450	-20,201
Total (All Adjustments)	N/A	-\$201,544	-\$7,977	-\$1,626	-63,079

Table 16 summarizes the overall impacts on TRC, SSM (no cap), SSM (with cap), LRAM, and natural gas savings from all of the recommendations identified and discussed in this report.

Table 16. Audit Adjustments to TRC, SSM, LRAM, and Natural Gas Savings

Account	Draft DSM 2011 Annual Report	2011 Audit Value	% Change
Net TRC	\$379,580,963	\$379,379,419	-0.05%
SSM (no cap)	\$9,773,825	\$9,765,848	-0.08%
SSM (with cap)	\$9,243,367	\$9,243,367	No Change
LRAM	\$822,251	\$820,625	-0.20%
Natural Gas Savings (m ³)	163,766,311	163,703,231	-0.04%



APPENDIX A. KEY MEETINGS

Meetings and Participants							
	Kick-off Meetir	ng - March 21, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Vincent DeRose	Julie Girvan	Kai Millyard				
ECONW	Steven Carter Randy Pozdena	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Josh Bachman	Jeff Hare	Craig Phillips				
	Audit Discuss	ion - April 11, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Vincent DeRose	Julie Girvan	Kai Millyard				
ECONW	Steven Carter	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Jeff Hare	Craig Phillips					
	Audit Discuss	ion - April 18, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Julie Girvan	Kai Millyard					
ECONW	Steven Carter	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Jeff Hare	Craig Phillips					
	Audit Discus	sion - May 2, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Julie Girvan	Kai Millyard					
	Steven Carter	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Jeff Hare						
	Audit Discus	sion - May 9, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Vincent DeRose	Julie Girvan	Kai Millyard				
ECONW	Steven Carter	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Craig Phillips						
	Review Draft A	udit - May 23, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Vincent DeRose	Julie Girvan	Kai Millyard				
ECONW	Steven Carter	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Craig Phillips						
	Review Draft A	udit - May 30, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Vincent DeRose	Julie Girvan	Kai Millyard				
ECONW	Steven Carter	Alec Josephson	Tessa Krebs	Tom Souhlas			
Cascade	Jeff Hare	Craig Phillips					
	Review Draft A	udit – June 11, 2012					
Union Gas	Leslie Kulperger	Tina Nicholson					
EAC	Vincent DeRose	Julie Girvan	Kai Millyard				
ECONW	Steven Carter	Alec Josephson	Tessa Krebs				
Cascade	Jeff Hare	Craig Phillips					



APPENDIX B. DOCUMENTS REVIEWED

Ontario Energy Board

Phase 1 - Decisions With Reasons (2006) Demand Side Management Guidelines For Natural Gas Utilities (2008)

Union Gas Limited

2011 DSM Draft Annual Report 2010 DSM Annual Report and Audit 2010 Audit Summary Results And Responses EB-2010-0055 - 2011 Demand Side Management Plan – Update EB-2010-0055 - Amendment to the 2011 Demand Side Management Plan – Incremental Low-Income Demand Side Management Plan C/I Marketing - Program Concept: Condensing Make-up Air (MUA) C/I Marketing - Program Concept: Condensing Boiler <300 MBTU/Hr

Verification Reports

Diamond Engineering Company

2011 Evaluation Of Distribution Contract Custom Projects

Beslin

Final Report ESK – Residential – Program Install Initiative (2011) Final Report ESK – Residential – Push Initiative (2011) Final Report ESK – Residential – Pull Initiative (2011) Final Report ESK – Residential – Replacement Program (2011) Final Report ESK-Helping Homes Conserve-HHC-Program Low-Income Initiative (2011)

Survey Instruments

Seeline

2011 Commercial Multi-Family Hot Water Conservation (HWC) Program

Energuy

Verification Report For Hot Water Conservation Commercial Non Multi-Family

Michaels Energy

Michaels No.: UB511AAN Union Gas 2011 Commercial And Industrial Markets Project Verification Final Report.

Navigant

Measures and Assumptions Demand Side Management (DSM) Planning. Appendix C: Substantiation Sheets



Estimated Realization Rates with related Confidence and Precision for Gas, Electricity and Water - 2012 Custom Projects Infrared Heater Substantiation Document

Other Documents

Enbridge Gas

EB-2011-0254: Enbridge Gas 2012 Substantiation Documents For New And Revised Measures

Agviro

Assessment Of Average Infrared Heater Savings. RFP#: 04-P7

Nexant

Market Study Of Natural Gas Fired Infrared Heaters

ASHRAE

Service Life Data Query: Boiler



Evaluation & Audit Committee Summary Results and Responses to the Audit of Union's 2011 DSM Annual Report

June 29, 2012

The purpose of this document is to outline the process followed for the Audit of the 2011 DSM Annual Report; provide a summary of Union's responses to the Auditor's recommendations and discussion with the Evaluation and Audit Committee (EAC), recalculate the corresponding impacts to the 2011 DSM savings claims, and present audit process issues or other recommendations brought forward by the EAC.

Audit Process

Selection of EAC members

The EAC was comprised of three Consultative representatives and two Union Gas representatives (Leslie Kulperger and Tina Nicholson).

The Consultative elected three EAC members via an e-mail casting for votes on January 18 2011, to represent the group through the Audit process. These representatives were:

- Kai Millyard Green Energy Coalition
- Julie Girvan Consumers Council of Canada
- Vince DeRose Canadian Manufacturers and Exporters

Selection of Auditor and Terms of Reference

The "Auditor Request for Proposal" and the proponent's proposals were reviewed by the EAC. The intervenor representatives of the EAC recommended ECONorthwest as the Auditor of the 2011 Annual Report. ECONorthwest was commissioned to undertake the Audit with full consensus of the EAC. The Request for Proposal is attached in Appendix A.

Information Exchange

The Consultative, including the members of the EAC, and ECONorthwest reviewed the Draft 2011 DSM Annual Report circulated by Union Gas on April 2, 2012.

Other than comments from members of the EAC, no additional comments were received from members of the Consultative.

ECONorthwest presented the EAC with the 2011 Draft Audit report on June 6, 2012 for review. Eight joint meetings with the EAC, ECONorthwest, and Union were held between March 21, 2012 and June 11, 2012 to initiate the audit process, review the Draft 2011 Annual DSM Report, the Draft Audit Report, and the Draft Final Audit Report.

Following these discussions, the 2011Audit of Union's DSM Annual Report was completed by ECONorthwest on June 15, 2012.

Auditor's Recommendations

The recommendations outlined in the Audit Report along with the resolution of those issues are documented below.

The Audit recommendations were focused in several areas that affected financial results for 2011 including:

• Proposed changes to TRC and LRAM

In addition to recommendations that affect TRC and LRAM, the Auditor also made recommendations in the following areas:

- Commercial & Industrial Custom verification realization rates
- Free ridership for new measures
- Adjust infrared program tracking
- Documentation improvement for Commercial Custom program

Auditor's Recommended Changes to TRC & Recalculation of SSM

Subject to the recommendations set out below, the Auditor's opinion is that Union's 2011 SSM claims `conform to the rules and principles set down by the Ontario Energy Board as ECONorthwest understands them.. While the recommendations noted below impact TRC, the corresponding affect on SSM is above the \$9.243 million cap and, as such, does alter the SSM earned in 2011.

Residential Recommendations

Recommendation #1

Regarding the current use of natural gas hot water heaters, change all "Don't Know" responses collected through surveys supporting the ESK verification study to "No" responses, and change the adjustment factors for the ESK Residential Push/Pull measures accordingly.

Resolution:

Union accepts the Auditor's recommendation for adjusting the TRC and LRAM. This results in a \$546,709 decrease in TRC and a decrease of \$2,805 in LRAM; however, as noted above, it will not alter the SSM claim. In addition, Union will treat the Auditor's recommendation on how to deal with "Don't Know" responses as 'best available information' until the Technical Evaluation Committee (TEC) has the opportunity to review and provide an opinion on the appropriate way to treat 'Don't Know' responses.

Recommendation #2

Assume that all "Don't Know" responses collected in the ESK verification study related to the use of low-flow showerheads indicate "No" use of low-flow showerheads, and change the adjustment factors for the ESK Residential Push/Pull measures accordingly.

Resolution:

Union accepts the Auditor's recommendation for adjusting the TRC and LRAM. This results in \$26,552 decrease in TRC and a decrease of \$114 in LRAM; however, as noted above, this will not alter the SSM claim. In addition, Union will treat the Auditor's recommendation on how to deal with "Don't Know" responses as 'best available' until the Technical Evaluation Committee (TEC) has the opportunity to review and provide an opinion on the appropriate way to treat 'Don't Know' responses.

Recommendation #3

Correct the equations used to calculate the adjustment factors for ESK Residential Push/Pull/Install Replacement measures resulting from a clerical error.

Resolution:

Union accepts the Auditor's recommendation. This results in a \$292,507 increase in TRC; however, as noted above, this will not alter the SSM claim. This also results in a \$1,161 increase in the LRAM claim.

Recommendation #4

Change the adjustment factors for the ESK Residential Push Showerhead Replacement measures to accurately reflect those reported in ESK verification study resulting from a clerical data-transfer error.

Resolution:

Union accepts the Auditor's recommendation. This results in a \$9,008 increase in TRC; however, as noted above, this will not alter the SSM claim. This also results in a \$37 increase in the LRAM claim.

Commercial Prescriptive Recommendations

Recommendation #5

Change the adjustment factors for the Commercial Multi-Family Hot Water Conservation (HWC) Program to match those identified in the verification study resulting from a clerical data-transfer error.

Resolution:

Union accepts the Auditor's recommendation. This results in a \$130,816 increase in TRC; however, as noted above, this will not alter the SSM claim. This also results in a \$497 increase in the LRAM claim.

Recommendation #6

Change the adjustment factors for the Commercial Non Multi-Family HWC Program to match those identified in the verification study resulting from a clerical data-transfer error.

Resolution:

Union accepts the Auditor's recommendation. This results in a \$13,018 increase in TRC; however, as noted above, this will not alter the SSM claim. This also results in a \$47 increase in the LRAM claim.

Commercial Quasi - Prescriptive Recommendations

Recommendation #7

Change the annual electricity savings rate for Condensing Make-up Air Units to accurately reflect industry practice.

Resolution:

Union accepts the Auditor's recommendation. This results in a \$10,482 increase in TRC net benefits. Union will update and file a new substantiation document reflecting this recommendation and treat the revised savings values as 'best available information' until the (TEC) has the opportunity to review and provide an opinion the appropriate input assumptions to be used in the Technical Reference Manual.

Commercial Custom Program

Recommendation #8

Use the audited savings for six of the Commercial Custom projects and adjust all Commercial Custom projects accordingly with the appropriate realization rates.

Resolution:

Union accepts the Auditor's recommendation. This results in a decrease of \$84,114 in TRC; however, as noted above, this will not alter the SSM claim. This also results in a \$450 decrease in the LRAM claim.

TRC Calculation

The eight recommended adjustments to TRC decreased Union's 2011 pre-Audit TRC claim of \$379,580,963 by \$201,544 to \$379,379,419.

The Table below outlines the TRC net benefits 2011 pre and post Audit results:

Program Segment	Pre-Audited Claimed Savings	Audited Savings
New Home Construction	\$ 33,066	\$ 33,066
Home Retrofit	\$ 16,301,290	\$ 16,029,545
Residential Program Costs	\$ (957,530)	\$ (957,530)
Net Residential TRC	\$ 15,376,827	\$ 15,105,081
Low Income	\$ 15,339,864	\$ 15,339,864
Low Income Program Costs	\$ (271,410)	\$ (271,410)
Net Low Income TRC	\$ 15,068,454	\$ 15,068,454
New Building Construction	\$ 7,982,194	\$ 7,972,800
Building Retrofit	\$ 25,053,586	\$ 25,133,183
Commercial Program Costs	\$ (519,801)	\$ (519,801)
Net Commercial TRC	\$ 32,515,979	\$ 32,586,182
Distribution Contract	\$ 324,376,629	\$ 324,376,629
Distribution Contract Program Costs	\$ (721,779)	\$ (721,779)
Net Distribution Contract TRC	\$ 323,654,850	\$ 323,654,850
Salaries	\$ (5,716,463)	\$ (5,716,463)
Research & Evaluation	\$ (1,269,738)	\$ (1,269,738)
Administration	\$ (48,946)	\$ (48,946)
Total Other Program Costs	\$ (7,035,147)	\$ (7,035,147)
Net TRC	\$ 379,580,963	\$ 379,379,419

SSM Calculation

The eight recommended adjustments to TRC net benefits did not affect Union's 2011 pre-Audit SSM claim of \$9,243,367 as it had surpassed the cap.

SSM = {[(Net TRC – (Range End Percentage x Target TRC)) / (Payout Increment Percentage x Target TRC)] x Incremental Payout} + Base Payout

= {[(Net TRC - (75% x \$252,652,675)) / (0.1 % x \$252,652,675)] x \$10,000} + \$2,250,000

 $= \{ [(\$379, 379, 419 - \$189, 489, 506) / \$252, 653] \times \$10,000 \} + \$2,250,000 \}$

= \$751.58 x \$10,000 + \$2,250,000

= \$9,765,848

	Shared Savings Me	echanis	n
	2011 Audited Re	esults	
Line No.	Particulars	Am	ount ⁽¹⁾ (\$)
	South		
1	M1 Residential	\$	566,187
2	M1 Commercial	\$	244,222
3	M1 Industrial	\$	73,472
4	M2 Commercial	\$	290,677
5	M2 Industrial	\$	207,076
6	M4 Industrial	\$	512,983
7	M5 Industrial	\$	980,927
8	M7 Industrial	\$	610,676
9	T1 Industrial	\$	4,404,012
10		\$	7,890,233
	Month		
1 1	<u>North</u>	Å	100 015
11	01 Residential	Ş	180,215
12	01 Commercial	Ş	71,589
13	10 Commercial	Ş	79,260
14	10 Industrial	Ş	24,972
15	20 Industrial	Ş	291,511
16	100 Industrial	\$ \$	1 252 124
17		Ş	1,353,134
18	Total	\$	9,243,367
(1)			

EAC Summary Results and Responses to the Audit of Union's 2011 DSM Annual Report

		Lost Revenue Adjustmen 2011 Unaudited R	nt Mec esult:	hanism s		
Line No.	Particulars	Audited Volumes $(10^3 m^3)$	$\begin{array}{c} 2011\\ \text{Audited Volumes} & \text{Delivery}\\ (10^3 \text{ m}^3) & \text{Rates } (\$/10^3\\ 3, \end{array}$		Revenue Impact (\$)	
		(2)		(h)	(a) [b]	
	South	(a)		(U)	(a).	~ (U) X 30-
1	M1 Residentia	1 5,387	Ś	40.757	Ś	109.783
- 2	M1 Commercial	4,447	ŝ	40.757	Ś	90,620
3	M1 Industrial	1,246	ŝ	40.757	ŝ	25,385
- 4	M2 Commercial	6,064	ŝ	40.763	Ś	123,586
5	M2 Industrial	3,129	\$	40.763	\$	63,771
6	M4 Industrial	7,981	\$	8.764	\$	34,973
7	M5 Industrial	14,414	\$	14.574	\$	105,037
8	M7 Industrial	12,780	\$	2.418	\$	15,450
9	T1 Industrial	86,670	\$	0.913	\$	39,565
10		142,117			\$	608,170
	North					
11	01 Residentia	l 1,653	\$	91.828	\$	75,892
12	01 Commercial	1,256	\$	85.583	\$	53,733
13	10 Commercial	1,549	\$	62.162	\$	48,153
14	10 Industrial	484	\$	57.001	\$	13,788
15	20 Industrial	4,577	\$	3.683	\$	8,429
16	100 Industria	l 12,067	\$	2.065	\$	12,459
17		21,586			\$	212,455
1.0	matal.	162 502			Ċ	000 005

Program and Evaluation Recommendations Arising from the Audit Report and EAC Discussions

Recommendations presented below were either put forward by the Auditor or were made by the intervenor members of the EAC. Given the nature of the recommendations in this section of the report are more process and programmatic in nature, related resolutions were determined in consultation and agreement with the EAC.

Recommendation #9

For the 2012 program year, Union should begin tracking the number of two-stage infrared heater units installed, and use the gas savings assumptions for each type of heater rather than the blended gas savings across heater types.

Resolution:

Union will update the savings values in the substantiation document to separate the twostage infrared heaters from single-stage and high intensity infrared heaters and provide the new information to the TEC.

Recommendation #10

Investigate the methods to disaggregate the blended incremental cost factor for infrared heaters.

Resolution:

Union will disaggregate the incremental cost for the two-stage infrared heaters from singlestage and high intensity infrared heaters. Union will also update the substantiation document to reflect this change and provide the new information to the TEC.

Recommendation #11

Decrease the Effective Useful Life (EUL) assumption for Condensing Boilers under 300 MBtu/h from 25 years to 22 years until an EUL of 25 years for this class of boilers is justified.

Resolution:

Union will treat this new information as 'best available information' until the TEC has the opportunity to review and provide an opinion the appropriate input assumptions to be used in the Technical Reference Manual.

Recommendation #12

Work with the TEC to develop a process for estimating free-ridership rates for new measures in the future. This recommendation followed the finding that Union adopted free

rider rates for new measures that were unsupported by evaluation because no better information was available at the time.

Resolution:

Union will work with the TEC to establish a process for estimating free-ridership rates for new measures in the future, which could include a provision to use default values until evaluated results are available. This review may include taking steps to revise specific free rider rates that have not been reviewed in some time.

Recommendation #13

Starting with the 2012 program year, calculate realization rates using stratification weights from the sample drawn for verification. This approach is in line with industry best practices, and will improve the statistical accuracy of the realization rates.

Resolution:

Union will provide the Auditor's recommendation to the TEC to ensure a harmonized process for both gas utilities.

Recommendation #14

Given limited resources for DSM evaluation and verification, the Audit Team recommends improving coordination among Union staff and consultants to reduce duplicative and potentially unnecessary efforts regarding the estimation of realization rates. The change means developing realization rates using the sampling stratification, and preparing final realization rate adjustments and the confidence and precision analysis after audited results are available.

Resolution:

In order to have a harmonized process across Ontario, Union will bring forward the Auditor's recommendation to the TEC.

Recommendation #15

To improve the information available for Commercial Custom projects, the Audit Team makes the following recommendations:

- Collect pre-project documentation of whether the project involves an expansion of production capacity.
- Collect pre-project utility history for the facility or meter where the project will be affected.
- Record baseline conditions (operating hours, operating usage, baseline equipment configuration, etc.).

- Collect post-project documentation of what equipment and operating changes were made.
- Record upgraded condition (operating hours, operating parameters, upgraded equipment configuration, etc.).

Resolution:

Union accepts the Auditor's recommendation and notes that many of the above documentation improvements have already been implemented. Union will continue to refine the Commercial Custom project data collection process.

Recommendation #16

The EAC requests that Union include a section in the DSM Annual Report that provide a status update on previous Audit recommendations.

Resolution:

Union will take this recommendation under advisement with the intent of including Audit recommendations in the DSM Annual Reports going forward.
Appendix A: 2011 Audit of DSM Annual Report RFP



REQUEST FOR PROPOSAL

Independent Audit of 2011 DSM Annual Report

January 17, 2012

Background

Union Gas Limited (Union) has delivered Demand Side Management (DSM) initiatives since 1997 to its broad customer base. DSM activities include planning, developing, implementing and evaluating energy efficiency initiatives for residential, commercial and distribution contract markets. 2011 serves as the fifth year under the constructs of the extended 2007 – 2009 DSM framework originally put forth and approved by the Ontario Energy Board (OEB) during a DSM Generic Proceeding in 2006. Annual program results are presented in a detailed annual report which is then subject to a third party audit. The 2011 DSM Annual Report contains a review of DSM program results and will be completed by April 1, 2012.

As a result of the 2002 Customer Review Process, and reconfirmed in the DSM Generic Proceeding, Union has established a **DSM Evaluation and Audit Committee (EAC)** made up of representatives from Union and the DSM Consultative (please refer to Appendix A for the list of DSM Evaluation and Audit Committee members). All Interveners in Union's most recent rate case are able to participate as members of the consultative. Although Union is technically a member of the EAC, for the purpose of this RFP, the "EAC" will be considered intervenor consultative representatives only, and will <u>not</u> include Union Gas.

Both Union and the EAC will be accessible to the Auditor to ensure a comprehensive review of the 2011 DSM Annual Report.

Union's DSM plan aims to achieve quantifiable savings, measured by Total Resource Cost (TRC) analysis. Union receives a Shared Savings Mechanism (SSM) based on the DSM portfolio program results, as well as a Lost Revenue Adjustment Mechanism (LRAM). In addition, DSM spending is tracked in a DSM Variance Account (DSMVA).

In 2011, Union operated seven energy efficiency programs:

Residential Markets

- New Home Construction
- Existing Customers
- Low Income Existing Customers

Market Transformation

• Drain Water Heat Recovery

Commercial and Industrial Markets

- New Build Construction
- Existing Buildings

Distribution Contract Market

• Industrial Process Improvements

A variety of delivery channels are used to promote the uptake of cost-effective energy efficient technologies through information and incentives. Programs are designed around measures for which input assumptions have been filed and approved by the OEB in accordance to the current DSM Framework.¹ All programs within the DSM portfolio are subject to evaluation based on the priorities identified in the year. SSM savings claimed through prescriptive and quasi-prescriptive measures are based on pre-approved input assumptions. The unique nature of Commercial/Industrial and Distribution Contract custom project input assumptions does not enable a prescriptive approach to the savings estimates, and consequently, there are no custom inputs filed with the OEB. Select programs, including Commercial/Industrial and Distribution Contract Custom programs are subject to verification by a third party, reports for which will be provided to the Auditor for review. LRAM savings are based on best available information at the time of the audit; Union will provide evaluation studies for review for LRAM purposes.

Union's DSM Plans and Annual Reports are reported and filed with the OEB as part of the Reporting and Record-keeping Requirement process.

Objective

The primary objective of the audit is to provide an independent opinion to DSM stakeholders (i.e. the OEB, Intervenor consultative members, and the Utility), that serves to determine if the SSM incentive calculation, Market Transformation incentive calculation, and LRAM calculation are appropriate.

As an initial requirement upon selection, the Auditor will meet with Union and the EAC to determine the priorities for the audit, and to set the audit approach to be followed to achieve the objective stated above. The deliverable will be a written report outlining the principles of the audit, the methodology followed, and the findings and recommendations of the audit.

The Auditor will provide an opinion on the SSM, LRAM, and DSMVA amounts presented in the Annual Report. A final Auditor opinion will indicate whether the data that has been gathered and recorded applies reasonable methods, is accurate in all material respects, and is consistent with the OEB rules and principles applicable to Union's 2011 DSM programs, SSM, LRAM, and DSMVA as outlined in EB2006-021 Decision with Reasons.²

¹ EB2006-021 Decision with Reasons: Generic Proceeding for DSM.

² ibid

Scope of Work

The following list outlines activities that are expected to be carried out for the purpose of this audit. The Auditor is encouraged to propose other tasks that they believe would be helpful in reaching the study objective.

- 1. Provide a detailed work plan and present to Union at the Launch Meeting. The Launch Meeting will allow the Auditor, Union, and the EAC to finalize the communication protocols that will be established and strictly adhered to for the duration of the 2011 Audit.
- 2. Attend, via teleconferencing, weekly audit status meetings to discuss Auditor processes, requirements, findings, and concerns with the EAC and Union.
 - a. The Auditor will work closely with Union to satisfy all questions and concerns prior to releasing the Draft Audit Report.
- 3. Audit the draft 2011 DSM Annual Report to identify if there are claims made by Union that have not been substantiated.
- 4. Review Union's procedures for tracking program participants and determine whether they lead to accurate counts.
- 5. Verify that Union's claimed input assumptions for SSM are accurate and consistent with the OEB filed and approved SSM input assumptions.
- 6. Verify that Union's claimed savings for LRAM are accurate and based on best available information at the time of the audit.
 - a. Changes to measure inputs must be based on 'best available information' established through relevant research presented during the audit. If alternative values are presented, the Auditor will discuss any derivation with Union and the EAC before rendering any opinions in regard to the alternatives. Proposed alternative values will be presented with a plausible range of values with full documentation from publicly available research made available for the EAC and Union to review at the time of the audit.³
- 7. Verify that the calculation methodology used to determine the SSM incentive and the LRAM amount adheres to the OEB approved method.
- 8. Review third party verification of commercial and distribution contract custom projects for reasonableness. This review will not duplicate the detailed third party analysis of savings estimates and evaluation findings. Instead, the audit review will provide an opinion on the methods and parameters used in consideration of the OEB framework under which the programs operate.
 - a. In addition to reviewing the verification reports, the Auditor may speak with the third party verification consultants and seek clarification as needed with either the verification consultant and/or Union Gas to ensure the Auditor has all the relevant information before forming any opinions.
 - b. As above, any recommendations to changing custom project inputs will be supported by relevant research.

³ In accordance with the OEB 2006-021 Decision with Reasons, changes to prescriptive measure inputs may impact LRAM but will not be retroactively applied to TRC or SSM.

- 9. Review and verify the appropriateness of the Market Transformation program claim and related shareholder incentive.
- 10. Review and provide an opinion on the DSMVA account.
- 11. Review evaluation studies conducted in support of the DSM portfolio and provide recommendations on priority evaluations for 2012.
- 12. Prepare a Draft Audit Report on the findings of these activities, including recommendations for future evaluation work. The Auditor will be expected to communicate the essence of recommendations put forward in the Draft Audit Report during weekly status update calls to ensure the EAC and Union are aware of, and have an opportunity to respond to, recommendations that it proposes.
- 13. Prepare and submit a Draft Final Audit Report. The purpose of the Draft Final Audit report is to allow all parties to review the report and ensure it accurately reflects the findings and discussions after the Draft Audit Report.
- 14. Prepare and submit a Final Audit Report.

To assist the Auditor in conducting the audit, the following will be made available to the Auditor:

- Access to the company's tracking system and documentation of program participants;
- Access to the company's cost-effectiveness screening model;
- Access to all previous DSM Annual Reports, (previously called Evaluation Reports) which outline terms of evaluation and objectives;
- Access to all evaluation research conducted during 2011;
- Access to 2011 verification studies of custom projects
- Comments from members of the DSM Intervenor consultative members will be forwarded; and,
- Support from Union staff, as required.

While Union is the "client" for the purpose of the audit, the EAC will be included in all communiqués with respect to the audit report.⁴ The Auditor will be provided with copies of comments submitted by all customer intervenor stakeholders. Relevant comments should be addressed in the audit report.

Any discussion of key findings and drafts of the audit report will be delivered directly to Union and the EAC for review and comment (email addresses are included in Appendix A).

⁴ In the event that customer sensitive data must be discussed, an alternate arrangement may be necessary to gain the information required.

<u>Schedule</u>

Following an OEB Directive, the independent audit of DSM results is to be completed and a recommendation filed with the OEB by the last day of the sixth month after the financial year end.

Due to the importance in meeting the OEB imposed deadlines, the Auditor will be contractually bound to meet the deadlines outlined in this RFP. Refer to the schedule presented in the table below. Failure to meet the deadlines will result in a payment penalty of \$700 per diem, with a maximum penalty not to exceed the value of the work. This penalty is contingent on receiving feedback on the Draft Audit Report from Union and the EAC by May 30, 2012; each business day feedback from Union and the EAC is delayed, a day will be applied to the Final Report deadline (i.e. if feedback on the Draft Report from Union and the EAC is received on May 30, the Final Report deadline will be June 11, 2012).

AUDIT SCHEDULE	
Activity	Due
RFP Dissemination	January 17, 2012
Intent to bid and questions of clarification	January 27, 2012 – 5:00p.m.
Proposals due	February 16, 2012 - 3:00 p.m.
Contract awarded	on or before March 2, 2012
Auditor work plan	Week of March 12, 2012
Launch Meeting	Week of March 12, 2012
DSM Annual Report sent to Auditor	on or before – April 2, 2012
EAC & Consultative written comments	on or before – April 9, 2012
Draft Audit Report	on or before May 16, 2012
Response from Union and EAC	on or before May 30, 2012
Final Draft Audit Report	on or before June 6, 2012
Final Audit Report	June 12, 2012

Qualifications and Experience Requirements

Union is seeking Auditors with demonstrated knowledge of, or experience in, the following areas:

- Current regulatory framework as established by the Ontario Energy Board in its Decision with Reasons EB-2006-021;
- Energy efficiency/DSM, marketing program evaluation and market transformation evaluation;
- A range of research capabilities;
- A range of methodological approaches including qualitative and quantitative assessments; and,

• Providing evaluations in a performance-based regulatory environment.

The criteria listed below will be considered in the evaluation of all proposals received:

- Clarity and comprehensiveness of the proposed approach to the audit;
- Experience in energy efficiency/DSM program evaluation and other relevant areas (as outlined above) and in all market sectors (residential, commercial, and industrial);
- Experience with gas utility DSM is essential, experience in Ontario and/or other parts of Canada will be considered an asset;
- Relevant engineering and/or technical experience;
- Knowledge of the Ontario regulatory framework;
- Demonstrated ability to work with (and be viewed as credible and objective by) a variety of different types of stakeholders, including utilities, environmental groups, consumer groups and industry; and,
- Reasonableness of the cost proposal.

Reporting Structure

The independent Auditor will be selected by Union and the EAC. The launch meeting with the Auditor will be held with all members of the EAC and representatives from Union to ensure a consistent understanding among all parties of the scope and expectations of the independent audit.

Throughout the period of the audit, the Auditor may contact the EAC and Union via email and as needed, however all correspondence must be sent to each person identified in "Appendix A". Weekly conference calls between the EAC, Union, and the Auditor will be arranged for group discussion and progress reporting.

The independent Auditor will be required to discuss all material concerns with the EAC and Union prior to presenting the Draft Audit Report and Draft Final Audit Report. Union and the EAC will review the Draft Audit Report and request any necessary revisions. The final Audit Report will be circulated with the entire DSM Intervener Consultative Group. Since portions of the Audit Report may be used to update Union's Annual Report and tables contained therein, please submit the Draft and Final Audit Report in editable MS Word and MS Excel files in addition to a non-editable 'pdf.'

Evaluation of Proposals

The following components are required in all proposals in order to be reviewed and considered:

1. Description of the planned approach to the audit, including an outline of the audit principles that will guide the work (LIMIT 4 PAGES);

2. Description of the project team assembled to execute the project, including an outline of each individual's qualifications;

3. An outline of the firm's background in the areas listed above;

4. Cost proposal.

<u>Contact</u>

Leslie Kulperger Manager, DSM Research & Evaluation Union Gas Limited 777 Bay Street 28th Floor, Suite 2801 Toronto, Ontario M5G 2C8

Phone: (416) 496-5360 Fax: (416) 496-5331 Email: lkulperger@uniongas.com

Deadline for Proposals

Proposals should be received no later than 3:00pm on February 16, 2012. All proposals should be forwarded via email to ensure prompt distribution to each of the three EAC members and two representatives from Union. Email addresses are listed in Appendix A.

Appendix A – Audit Contacts

Union Gas

Leslie Kulperger Union Gas Ikulperger@uniongas.com

Tina Nicholson Union Gas tnicholson@uniongas.com

Evaluation and Audit Committee

Julie Girvan Consumers Council of Canada jgirvan@ca.inter.net

Kai Millyard Green Energy Coalition kai@web.ca

Vince DeRose Industrial Gas Users Association vderose@blgcanada.com